

41

42

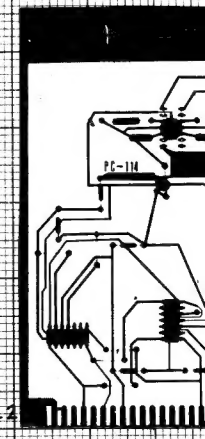
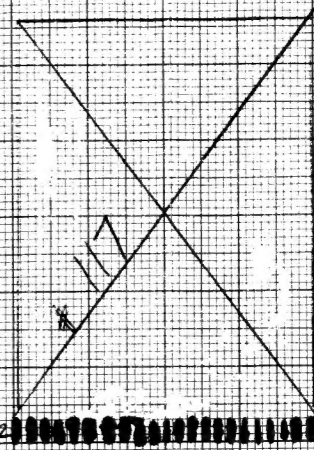
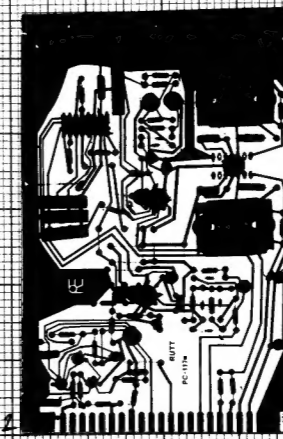
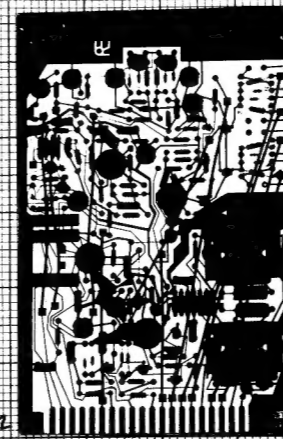
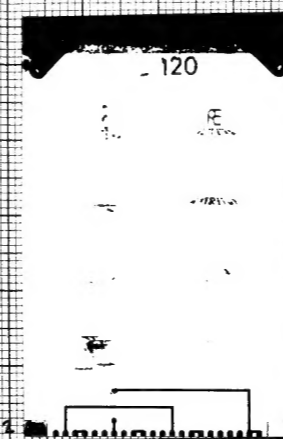
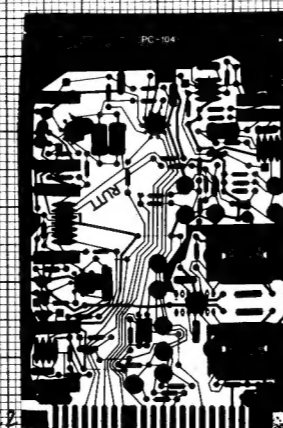
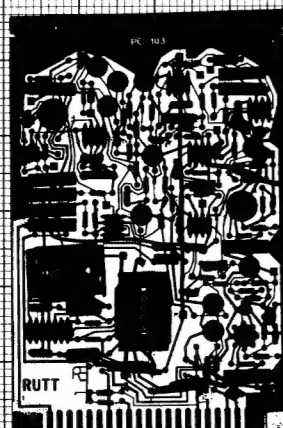
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44

45

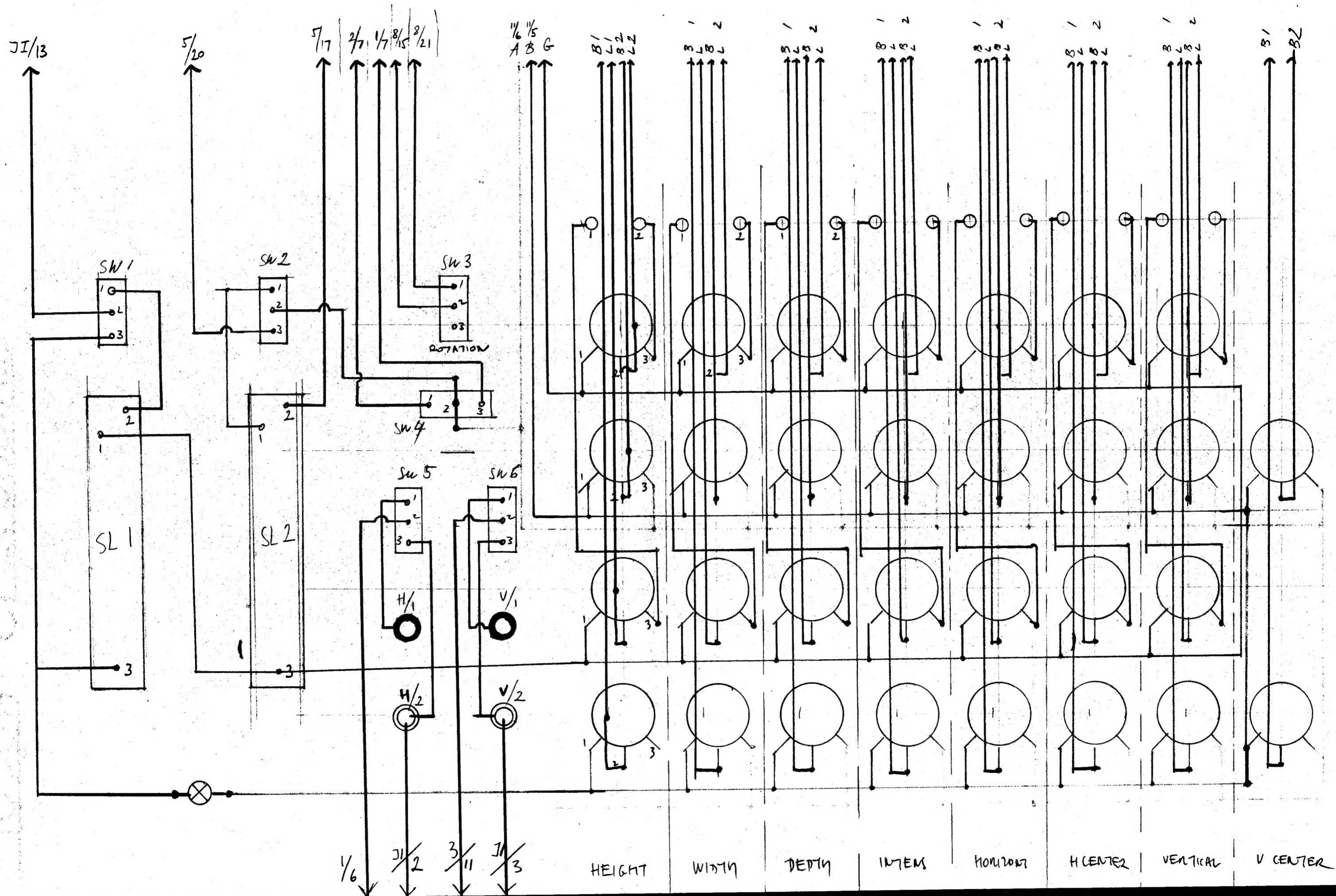
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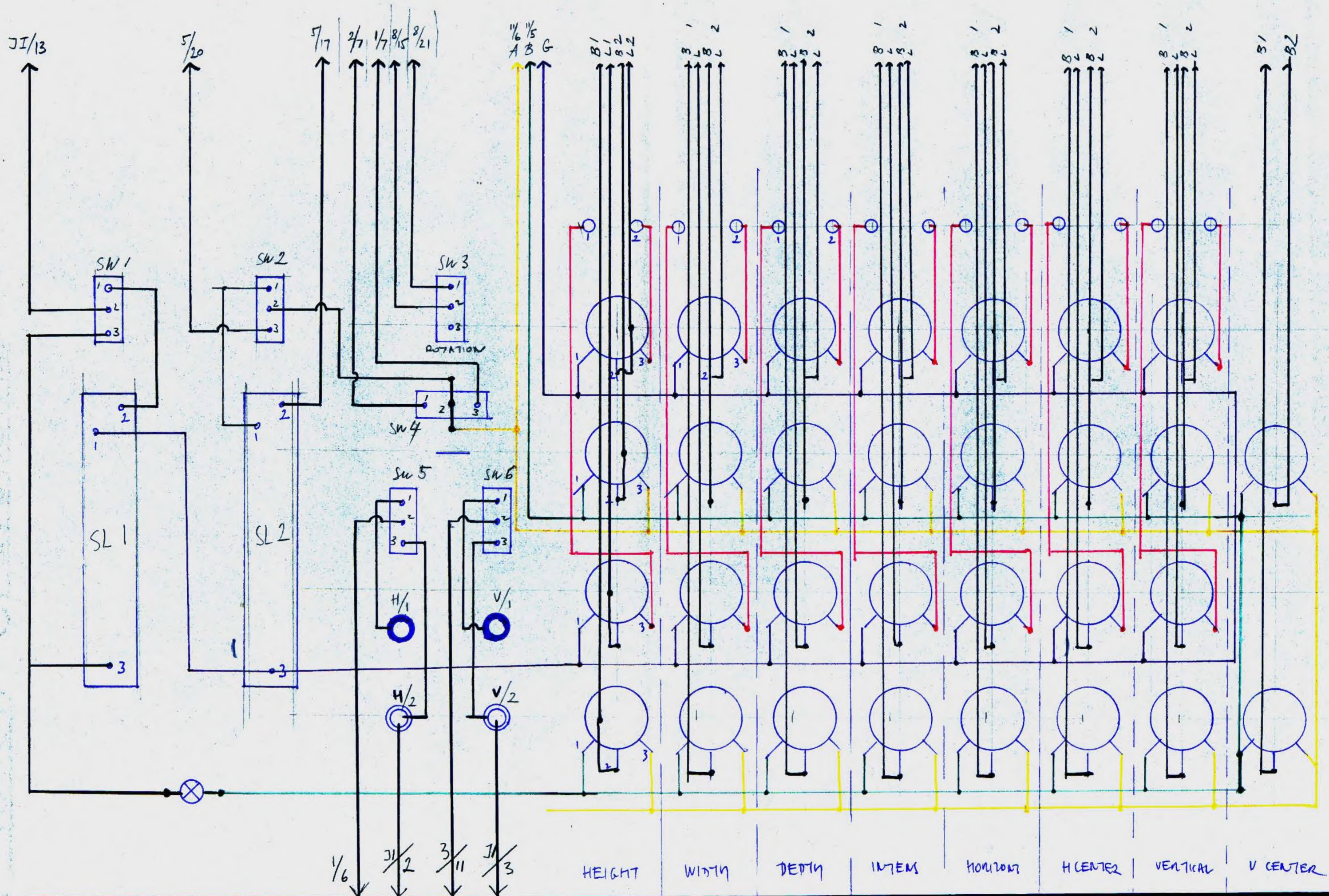
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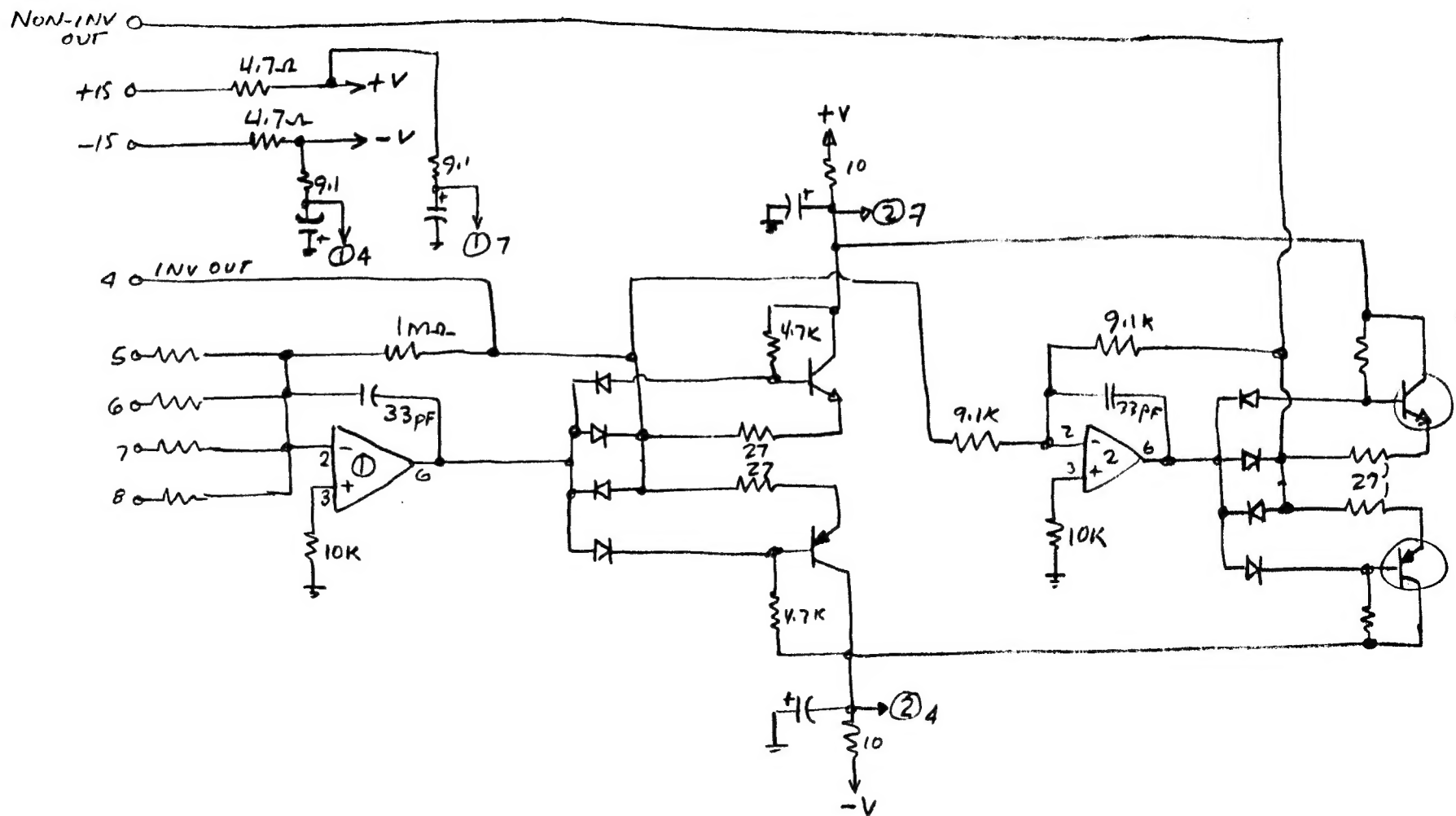


T-7-106  
HORIZONTAL  
BOARD

INTERNAL  
TIMING  
BOARD







PC-54

TRONOTEC, INC.  
Church Road Laboratory  
Franklin, New Jersey

# PARTS LIST

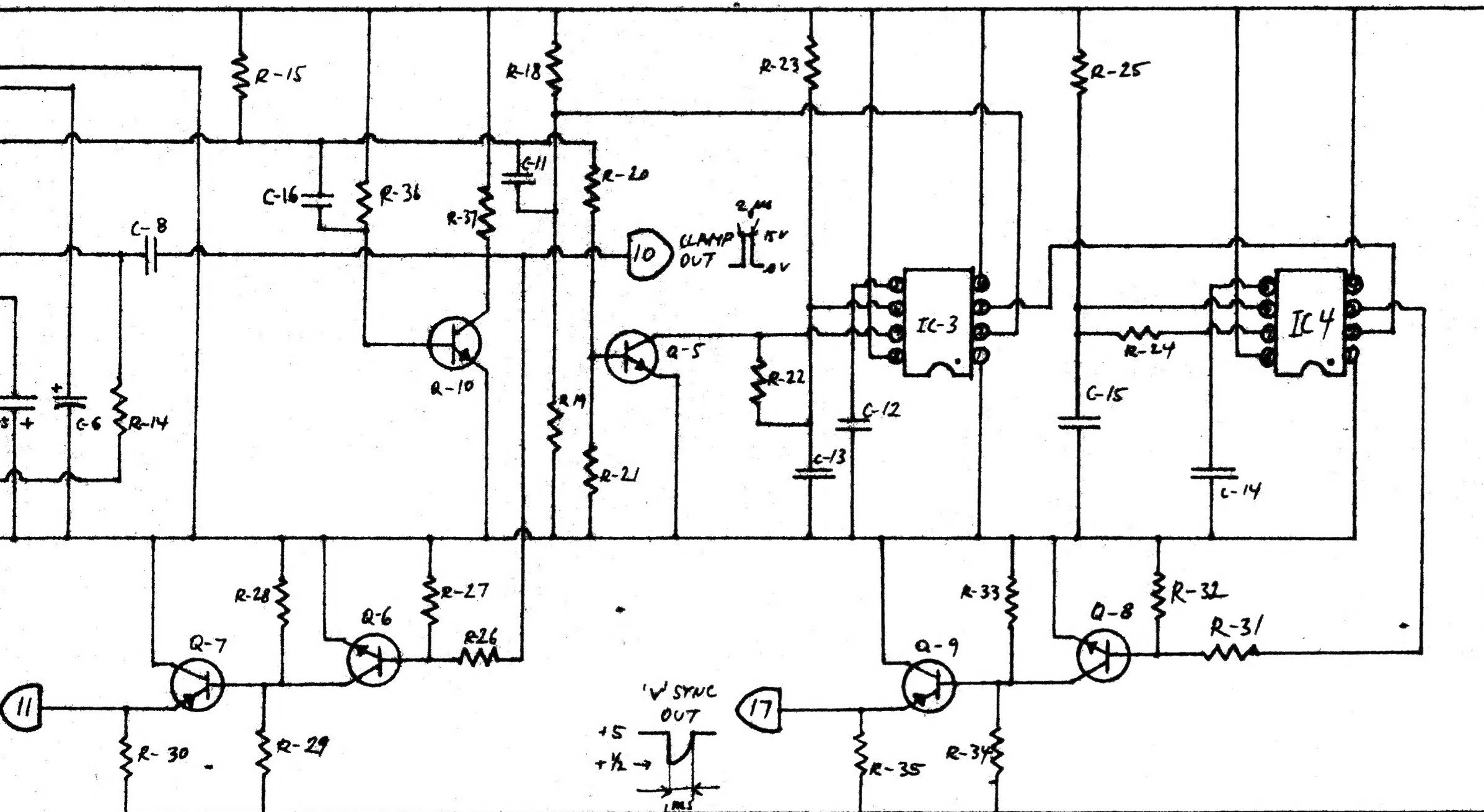
(ECO) DISPLAY

DATE 12/5/75 PROJECT RE 4 1/2 ASSY PC-116A DRAWING \_\_\_\_\_ SHEET 1 OF \_\_\_\_\_

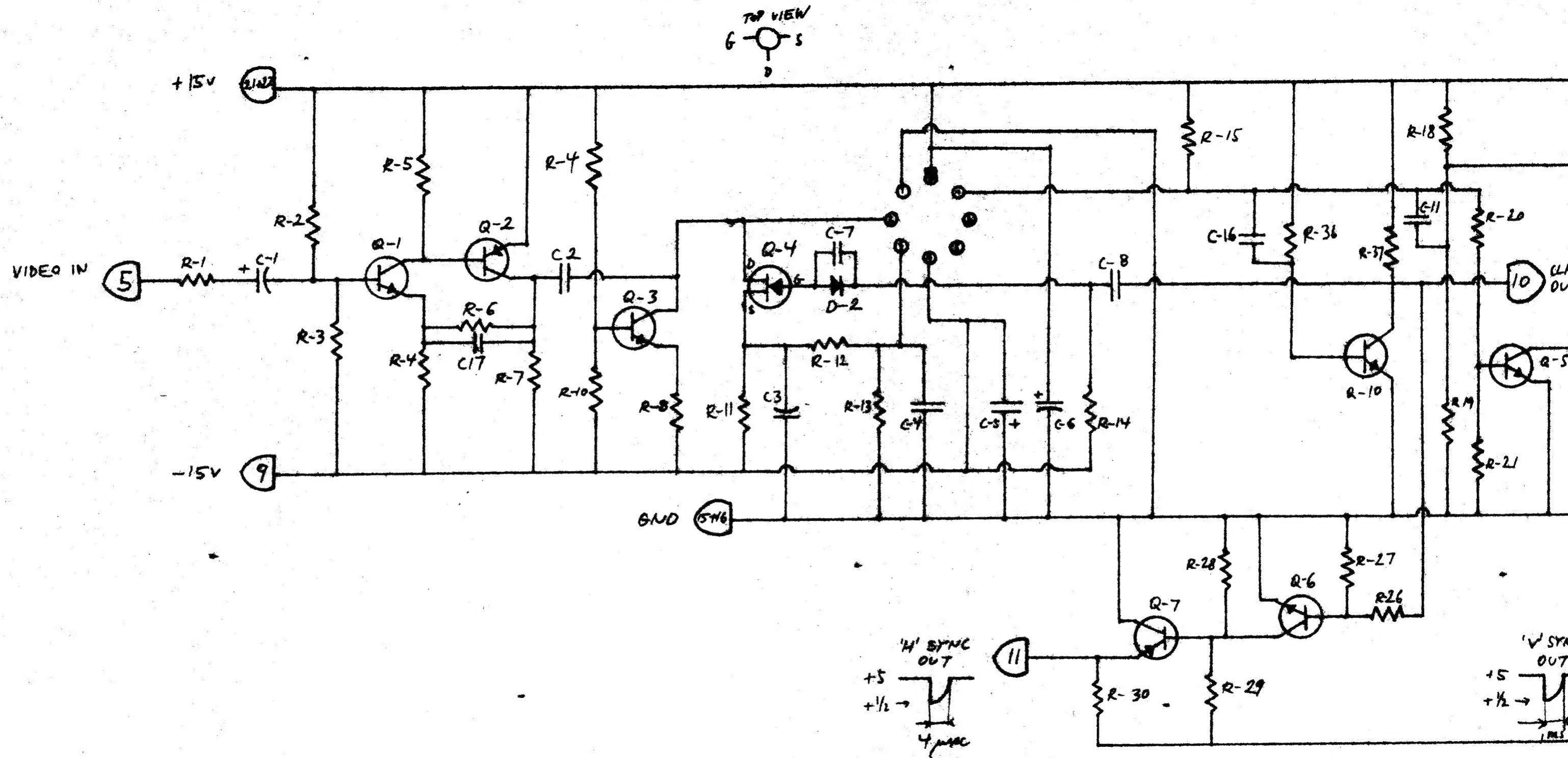
REF	DESCRIPTION	MFR PART NR.	MFR.	TRONOTEC PM	QTY	UNIT	PRICE	TOTAL
IC-1	COMPARATOR	LM311	NSC		1			
IC 3,4	TIMER	NE 555V	SIG		2			
Q1,3,5,6, 8,10	NPN	2N3568			8			
Q2,7,9	PNP	2N3638A			3			
Q4	FET	2N4091			1			
DI,2	DIODE, SILICON, SIGNAL	1N914			2			
C1,3,5,6	Capacitor, Elec-Tant 15 $\mu$ F/20V				4			
02,4,12, 14,15	" , Ceramic .1 $\mu$ F				5			
C7	" " 10pF				1			
C8	" Mylar 10nF				1			
C11	" Ceramic 100pF				1			
C13	" " 470pF				1			
C16	" " 220pF				1			
C17	" " 5pF				1			
R1,21,30, 32,35,27	Resistor - 1/4W, 5% 1K $\Omega$				6			
R2	" 270K				1			
R3	" 47K				1			

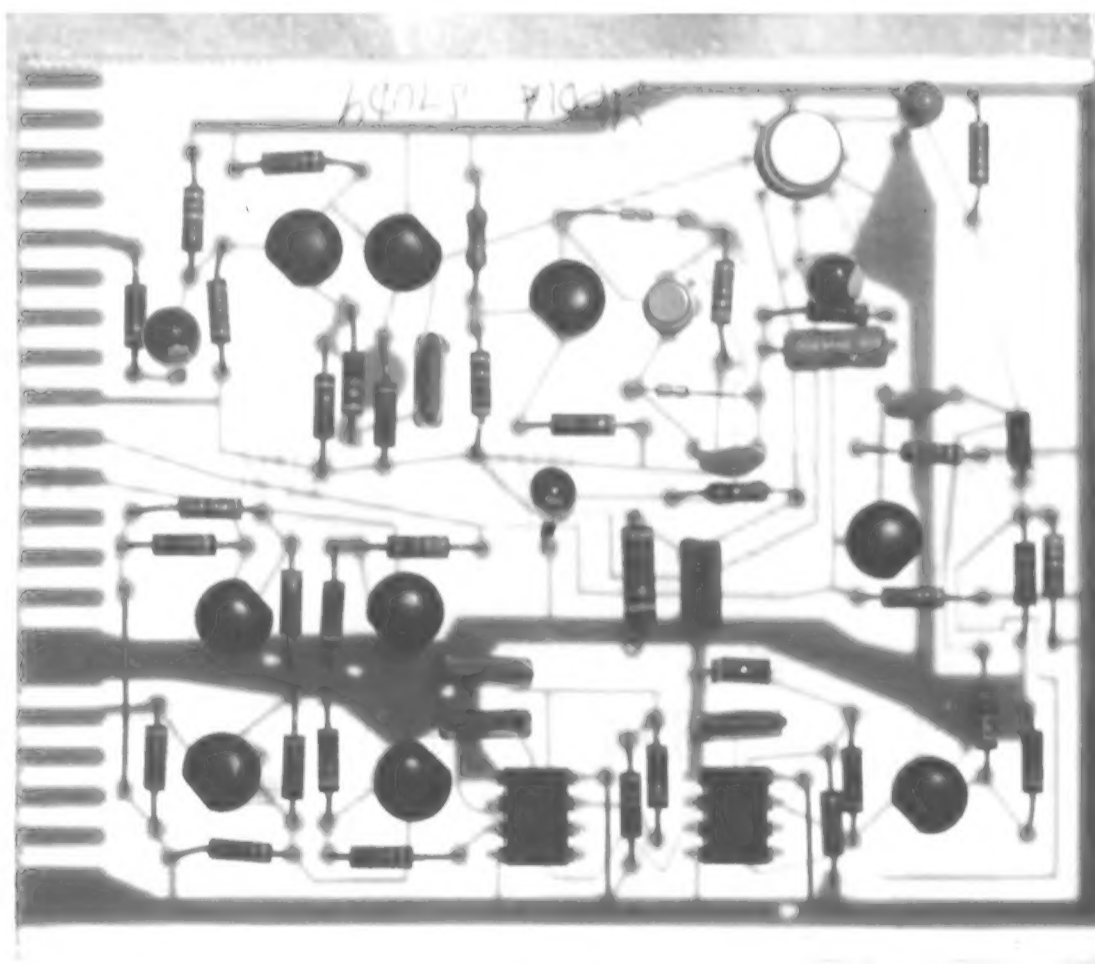
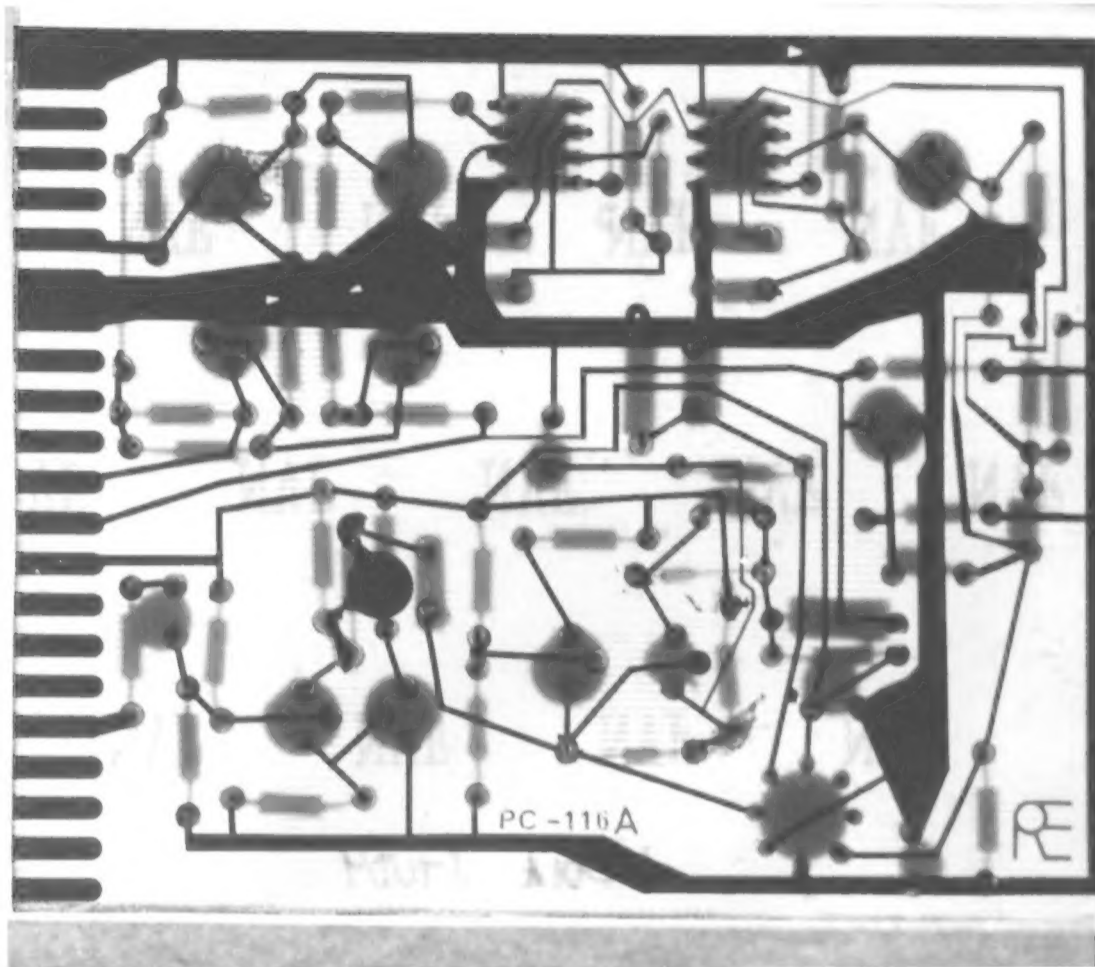
SHEET 2 OF

[illegible]



PC-116  
 RUTT ELECTROPHYSICS  
 APR 1974  
 MODIFIED TO 116A





## INPUTS

FROM

ROT. GLASS

UN-BLANK

BLANK


3. LINES IF FURTHER  
NOTES IS ACCIDENTLY  
DELETED.

H SWEET FLANK  
(FROM B'D SWEET FLANK)  
2007-01-11 10:00

SIGMA INDUSTRIES  
VIDEO RECORDING  
AT THE J. Edgar Hoover

'V' POS, 'V'  
DUAL-TRACE

off



BLANKS IF VPOS IS  
 $\geq 10V$  + ONE LINE  
 WHEN PICTURE IS  
 VERTICALLY CHIPPED

'H' SWEEP RESET

FROM 'B' H. SWEET OF  
CLIP-ALONG FIRM  
PC-142

## OUTPUTS

70

## 'V' MODULE SYNC

## 'H' MODULE SYNC

(H) - 10V BLANK END

'V' SWEEP

(GROUND THROUGH B.H. SWEEP STATION - VN-OR-100)

'H' SWEEP

DISPLAY BLANKING  
(TO DISPLAY)

Timing diagram for the UN-BLANK signal. The signal is high (>7V) for most of the frame and drops to low (<1V) for a short duration. The low pulse is labeled 'UN-BLANK (41)' and 'BLANK (0)'.

1000A  
- 20 MA

PC-104

- IC-1 SG-4501
- IC-2 555 'V' RESET TIME
- IC-3 555 'V' UN-BLANK
- IC-4 555 'H' RESET TIME
- IC-5 LM 318 'H' INTEGRATOR
- IC-6 AHO133CD - AHO134CD RET. SWITCH
- IC-7 LM 318 'V' INTEGRATOR
- IC-8 LM 319 COMP. FOR SWEEP -11V BLANK

- Q-1 NPN 40409
- Q-2 PNP 40410
- Q-3 NPN - 2N3565
- Q-4 NPN -
- Q-5 NPN -
- Q-6 NPN -
- Q-7 PNP
- Q-8 NPN -
- Q-9 PNP
- Q-10 NPN -
- Q-11 NPN -
- Q-12 PNP
- Q-13 NPN -

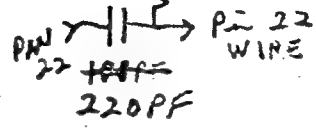
- D-1 5V ZENER
- D-2 5V ZENER
- D-3 1N914

CHANGE TO  
1K RESISTORS

A00

+15V

10K



- R-8 'V' RESET - SET TP-1 FOR 1250ms POSITIVE PULSE WIDTH
- R-11 'V' UN-BLANK - SET TP-2 FOR 15.5ms POSITIVE PULSE WIDTH
- R-18 'H' RESET - SET TP-3 FOR 15ms POSITIVE PULSE WIDTH
- R-20 'H' SWEEP RESET VOLTAGE - SET TP-4 FOR +10V
- R-24 'H' SWEEP ΔV/ΔT
- R-31 'V' SWEEP RESET VOLTAGE - SET TP-5 FOR +10V
- R-34 'V' SWEEP ΔV/ΔT
- R-46 -11V SWEEP BLANK - SET TP-6 TO -11V

- |        |              |      |          |
|--------|--------------|------|----------|
| 4 C-1  | .1 CER ✓     | R-1  | .525     |
| 4 C-2  | .1 CER ✓     | R-2  | .525     |
| 4 C-3  | .1 GUV       | R-3  | 100K     |
| 3 C-4  | 15 20V TAN ✓ | R-4  | 4.7K     |
| 3 C-5  | 25 72V TAN ✓ | R-5  | 4.7K     |
| 3 C-6  | 25 72V TAN ✓ | R-6  | 75Ω      |
| 4 C-7  | 220PF CER ✓  | R-7  | 1K -     |
| 4 C-8  | .14 CER ✓    | R-8  | 20K POT  |
| 4 C-9  | .14 MYL ✓    | R-9  | 75Ω -    |
| 4 C-10 | .1 CER ✓     | R-10 | 33K -    |
| 4 C-11 | .1 MYL ✓     | R-11 | 100K POT |
| 4 C-12 | .1 MYL ✓     | R-12 | 16K -    |
| 4 C-13 | 100PF CER ✓  | R-13 | 10K -    |
| 4 C-14 | 100PF CER ✓  | R-14 | 2.2K -   |
| 4 C-15 | .1 CER ✓     | R-15 | 10Ω -    |
| 4 C-16 | .001 MYL ✓   | R-16 | 10Ω -    |
| 4 C-17 | 15 20V ✓     | R-17 | 1K -     |
| 4 C-18 | 15 20V ✓     | R-18 | 20K POT  |
| 4 C-19 | 15 20V TAN ✓ | R-19 | 75Ω -    |
| 4 C-20 | .001 MYL ✓   | R-20 | 20K POT  |
| 4 C-21 | 100PF CER ✓  | R-21 | 20K -    |
| 4 C-22 | 15 20V TAN ✓ | R-22 | 1K -     |
| 3 C-23 | 15 20V TAN ✓ | R-23 | 4.7K -   |
| 4 C-24 | .14 MYL ✓    | R-24 | 20K POT  |
| 4 C-25 | .14 MYL ✓    | R-25 | 10K -    |
| 4 C-26 | 15 20V TAN ✓ | R-26 | 2.2K -   |
| 4 C-27 | .14 CER ✓    | R-27 | 10Ω -    |
|        |              | R-28 | 10Ω -    |
|        |              | R-29 | 2.7K -   |
|        |              | R-30 | 1K -     |
|        |              | R-31 | 20K POT  |
|        |              | R-32 | 10K -    |
|        |              | R-33 | 10K -    |
|        |              | R-34 | 20K POT  |
|        |              | R-35 | 2.7K -   |
|        |              | R-36 | 1K -     |
|        |              | R-37 | 270Ω     |
|        |              | R-38 | 270Ω     |
|        |              | R-39 | 10K -    |
|        |              | R-40 | 100K -   |
|        |              | R-41 | 100K -   |
|        |              | R-42 | 100K -   |
|        |              | R-43 | 100K -   |
|        |              | R-44 | 20K -    |
|        |              | R-45 | 75Ω -    |
|        |              | R-46 | 20K POT  |
|        |              | R-47 | 75Ω -    |

CER - CERAMIC  
TAN - TANTALUM  
MYL - MYLAR

H-3

+100MA  
- 20 MA

# PC-104

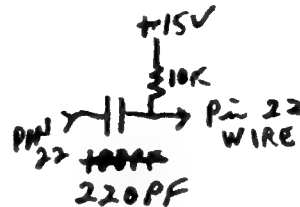
- IC-1 SG-4501
- IC-2 555 'V' RESET TIME
- IC-3 555 'V' UN-BLANK
- IC-4 555 'H' RESET TIME
- IC-5 LM 318 'H' INTEGRATOR
- IC-6 AH0133CD ~ AH0134CD RET. SWITCH
- IC-7 LM 318 'V' INTEGRATOR
- IC-8 LM 319 COMPARTOR SWEEP -11V BLANK

- Q-1 NPN 40409
- Q-2 PNP 40410
- Q-3 NPN - 2N3565
- Q-4 NPN -
- Q-5 NPN -
- Q-6 NPN -
- Q-7 PNP
- Q-8 NPN -
- Q-9 PNP
- Q-10 NPN -
- Q-11 NPN -
- Q-12 PNP
- Q-13 NPN -

- D-1 5V ZENER
- D-2 5V ZENER
- D-3 1N914

CHANGE TO  
1K RESISTORS

ADD



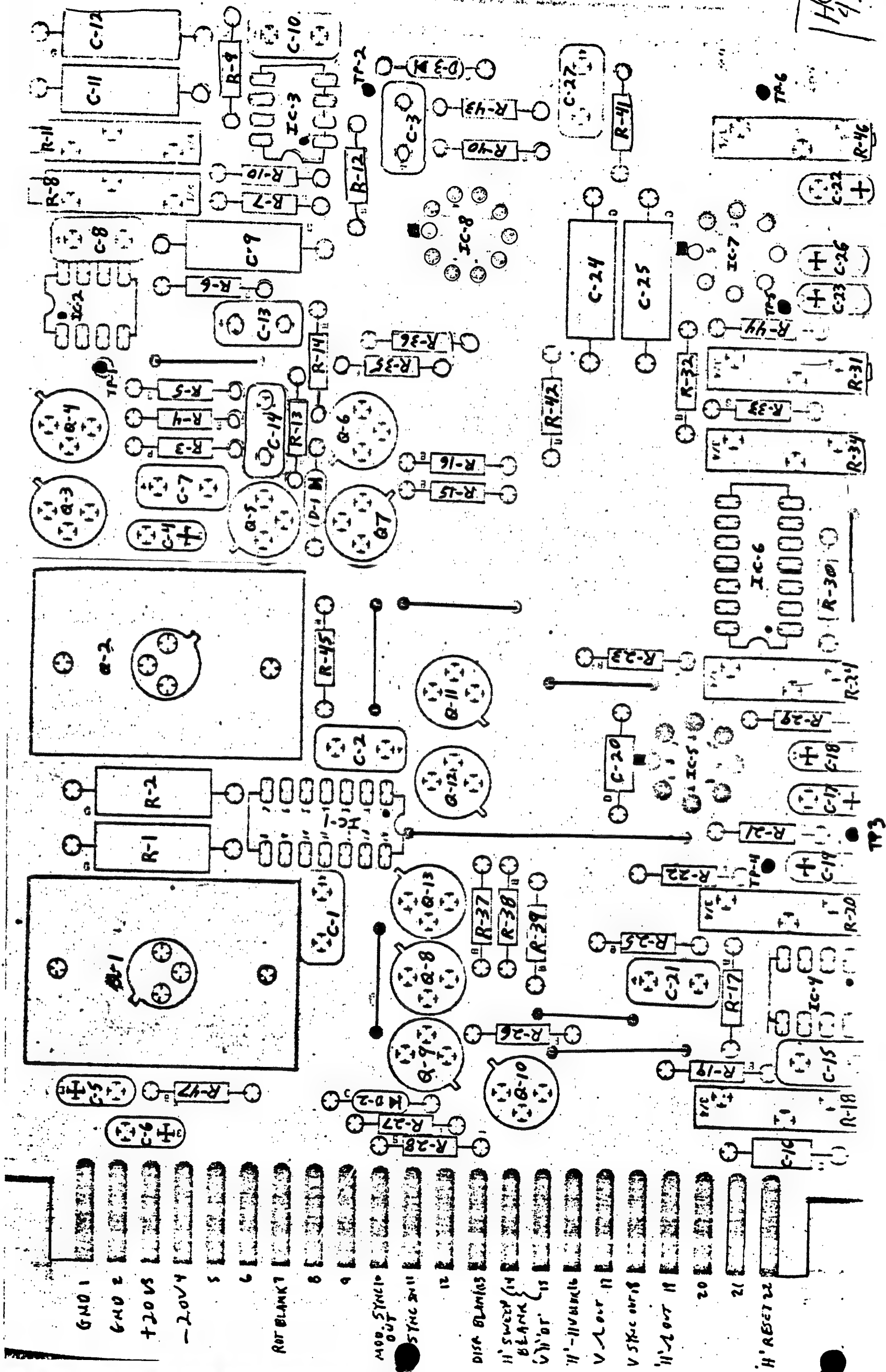
- C-1 .1 CER ✓
- C-2 .1 CER ✓
- C-3 .1M GLV ✓
- C-4 154 20V TAN ✓
- C-5 25.4 725V TAN ✓
- C-6 154 725V TAN ✓
- C-7 220PF CER ✓
- C-8 .1M CER ✓
- C-9 .1M MYL ✓
- C-10 .1 CER ✓
- C-11 .1 MYL ✓
- C-12 .1 MYL ✓
- C-13 100PF CER ✓
- C-14 100PF CER ✓
- C-15 .1 CER ✓
- C-16 .001 MYL ✓
- C-17 154 20V ✓
- C-18 154 20V ✓
- C-19 154 20V TAN ✓
- C-20 .001M MYL ✓
- C-21 100PF CER ✓
- C-22 154 20V TAN ✓
- C-23 154 20V TAN ✓
- C-24 .1M MYL ✓
- C-25 .1M MYL ✓
- C-26 154 20V TAN ✓
- C-27 .1M CER ✓

- R-8 'V' RESET - SET TP-1 FOR 1250ms POSITIVE PULSE WIDTH
- R-11 'V' UN-BLANK - SET TP-2 FOR 15.5ms POSITIVE PULSE WIDTH
- R-18 'H' RESET - SET TP-3 FOR 15ms POSITIVE PULSE WIDTH
- R-20 'H' SWEEP RESET VOLTAGE - SET TP-4 FOR +10V
- R-24 'H' SWEEP ΔV/ΔT
- R-31 'V' SWEEP RESET VOLTAGE - SET TP-5 FOR +10V
- R-34 'V' SWEEP ΔV/ΔT
- R-46 -11V SWEEP BLANK - SET TP-6 TO -11V

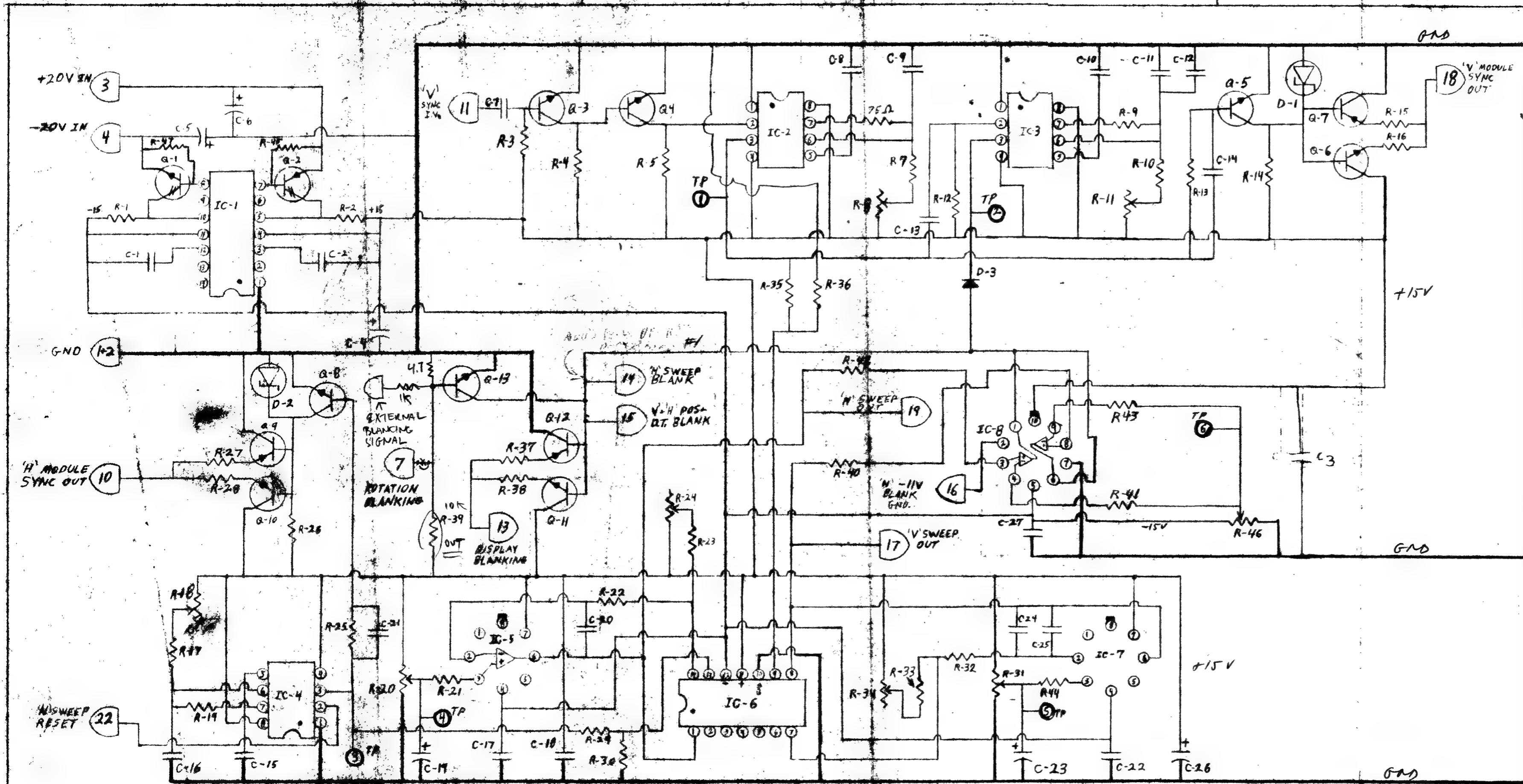
- R-1 .52 50K
- R-2 .52 50K
- R-3 100K
- R-4 4.7K
- R-5 4.7K
- R-6 75Ω
- R-7 1K
- R-8 20K POT
- R-9 75Ω
- R-10 33K
- R-11 100K POT
- R-12 10K
- R-13 10K
- R-14 2.2K
- R-15 10Ω
- R-16 10Ω
- R-17 1K
- R-18 20K POT
- R-19 75Ω
- R-20 20K POT
- R-21 20K
- R-22 10Ω
- R-23 4.7K
- R-24 20K POT
- R-25 10K
- R-26 2.2K
- R-27 10Ω
- R-28 10Ω
- R-29 2.7K
- R-30 1K
- R-31 20K
- R-32 20K POT
- R-33 10K
- R-34 20K POT
- R-35 2.7K
- R-36 1K
- R-37 270Ω
- R-38 270Ω
- R-39 10K
- R-40 10K
- R-41 10K
- R-42 10K
- R-43 10K
- R-44 20K
- R-45 75Ω
- R-46 20K POT
- R-47 75Ω

COR - CORONA  
TAN - TANGENT

HC.5  
42

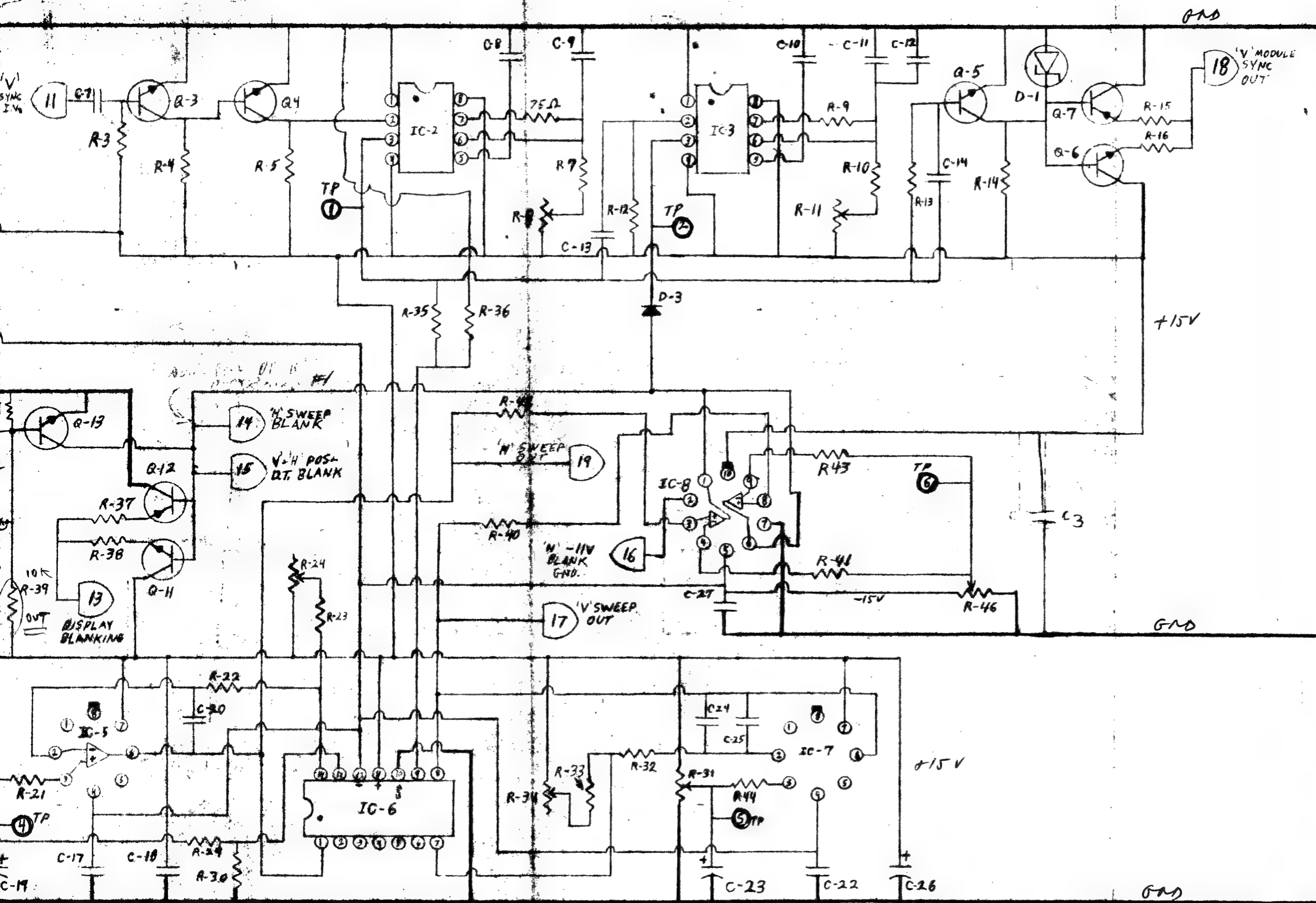






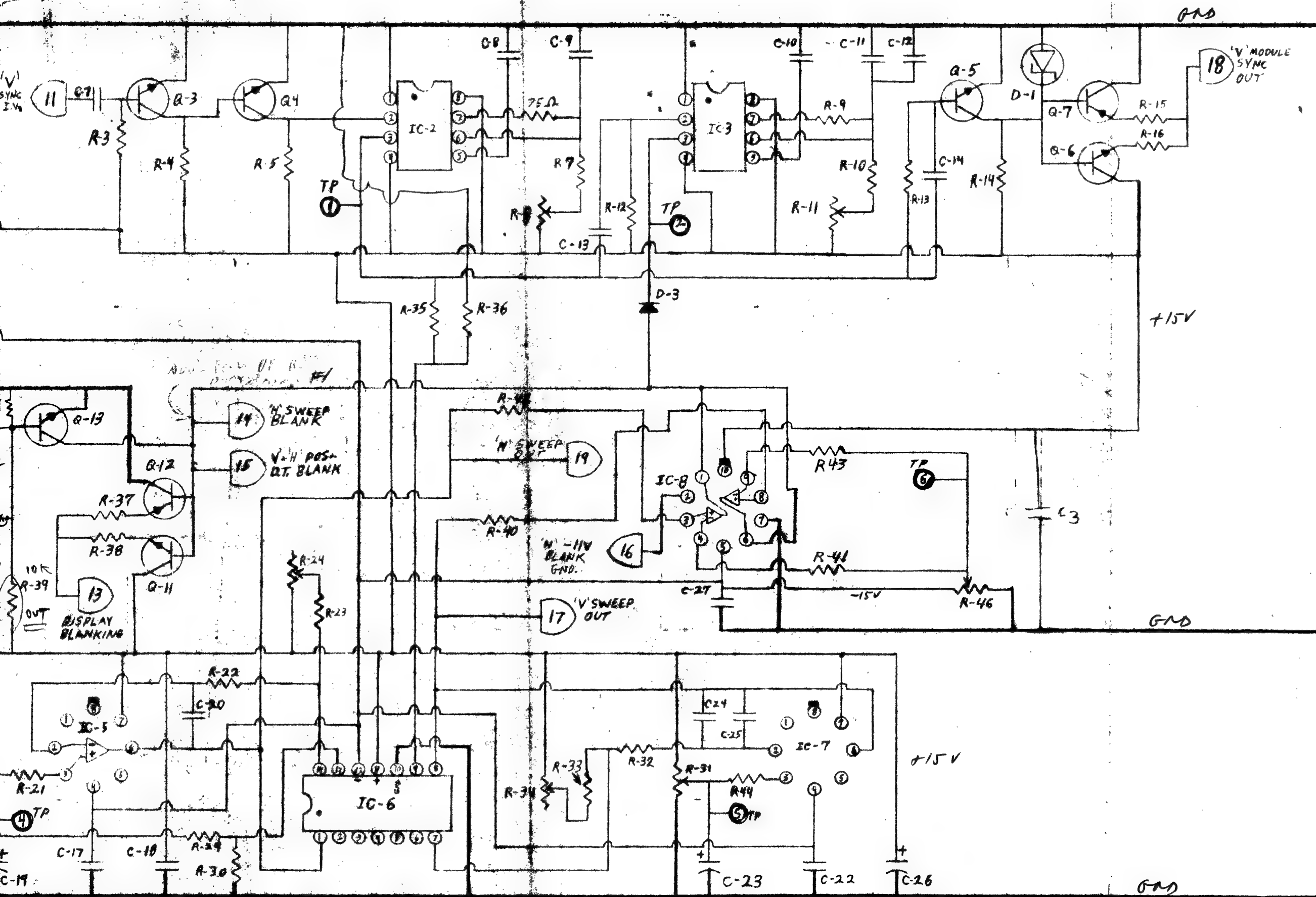
PC-104

SE MODIFICK  
FOR GX7



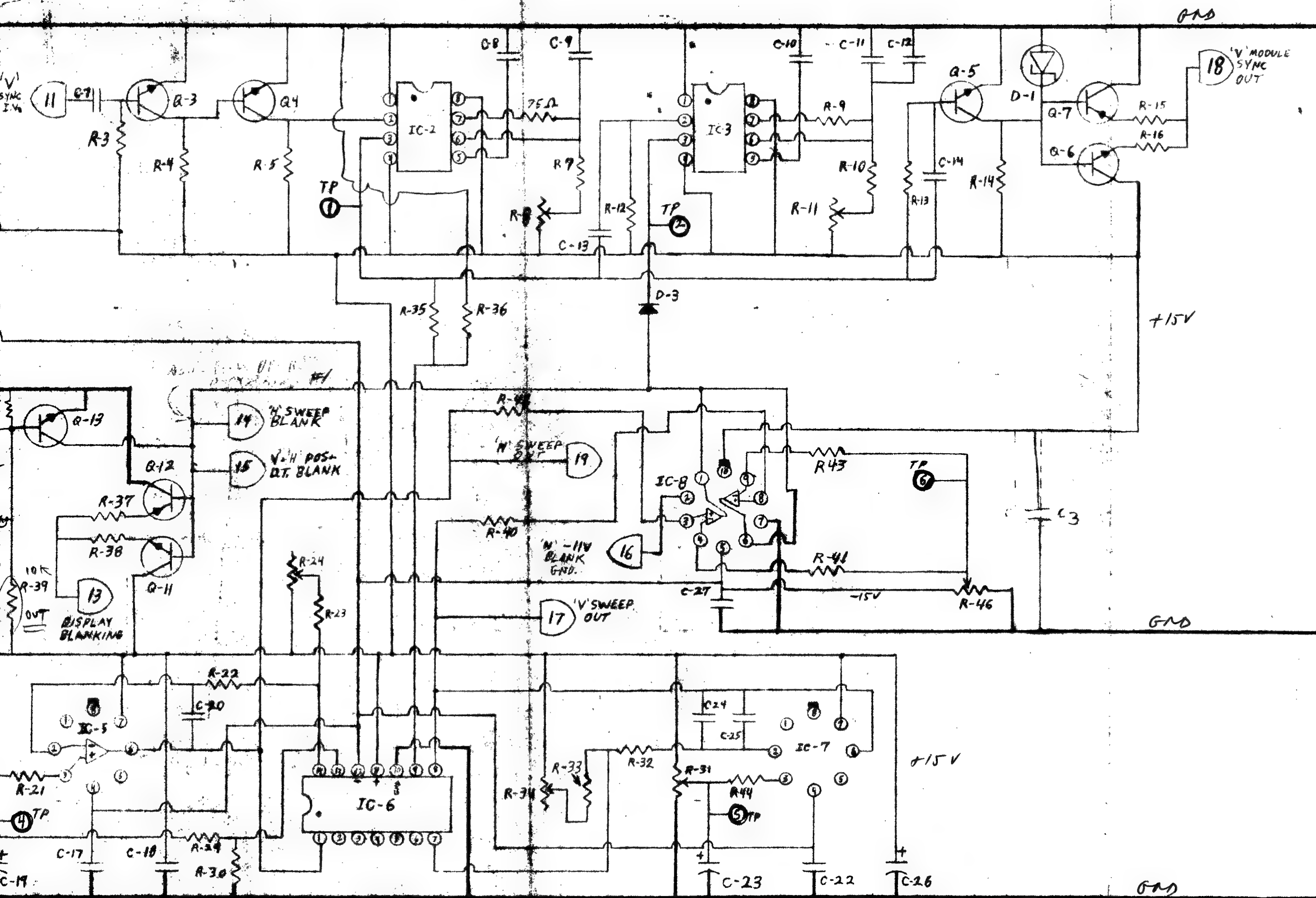
PC-104

SE MODIFIED  
FOR QX7



PC-104

SE MODIFICATION  
FOR QX7 BLKING



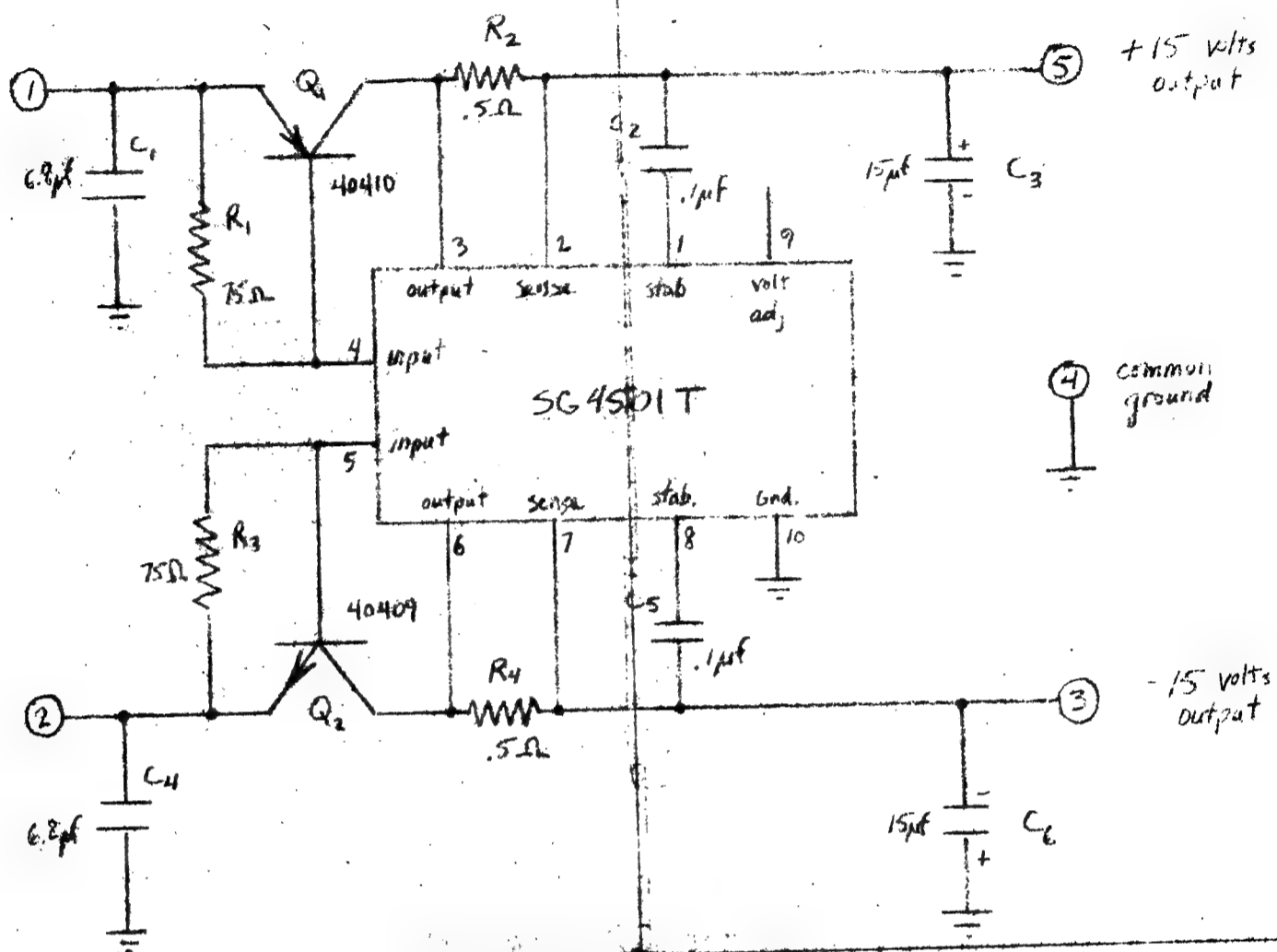
PC-104

SE MODIFICATION  
FOR QX7 BLKING

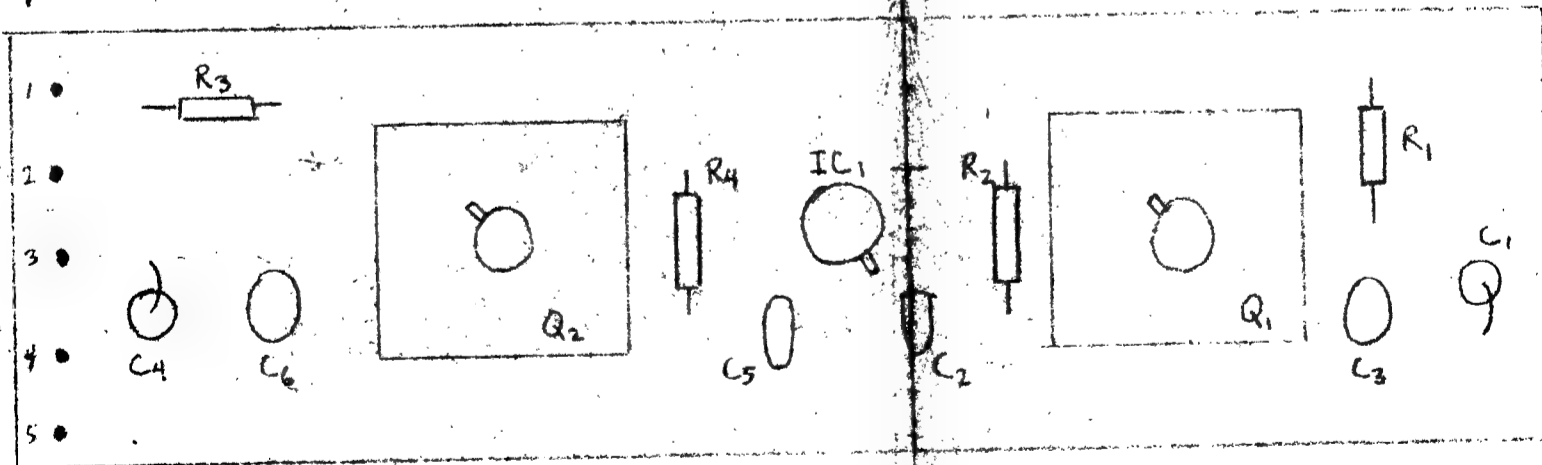
# PC 105

## $\pm 15V$ REGULATED POWER SUPPLY BOARD

(6 JAMES)

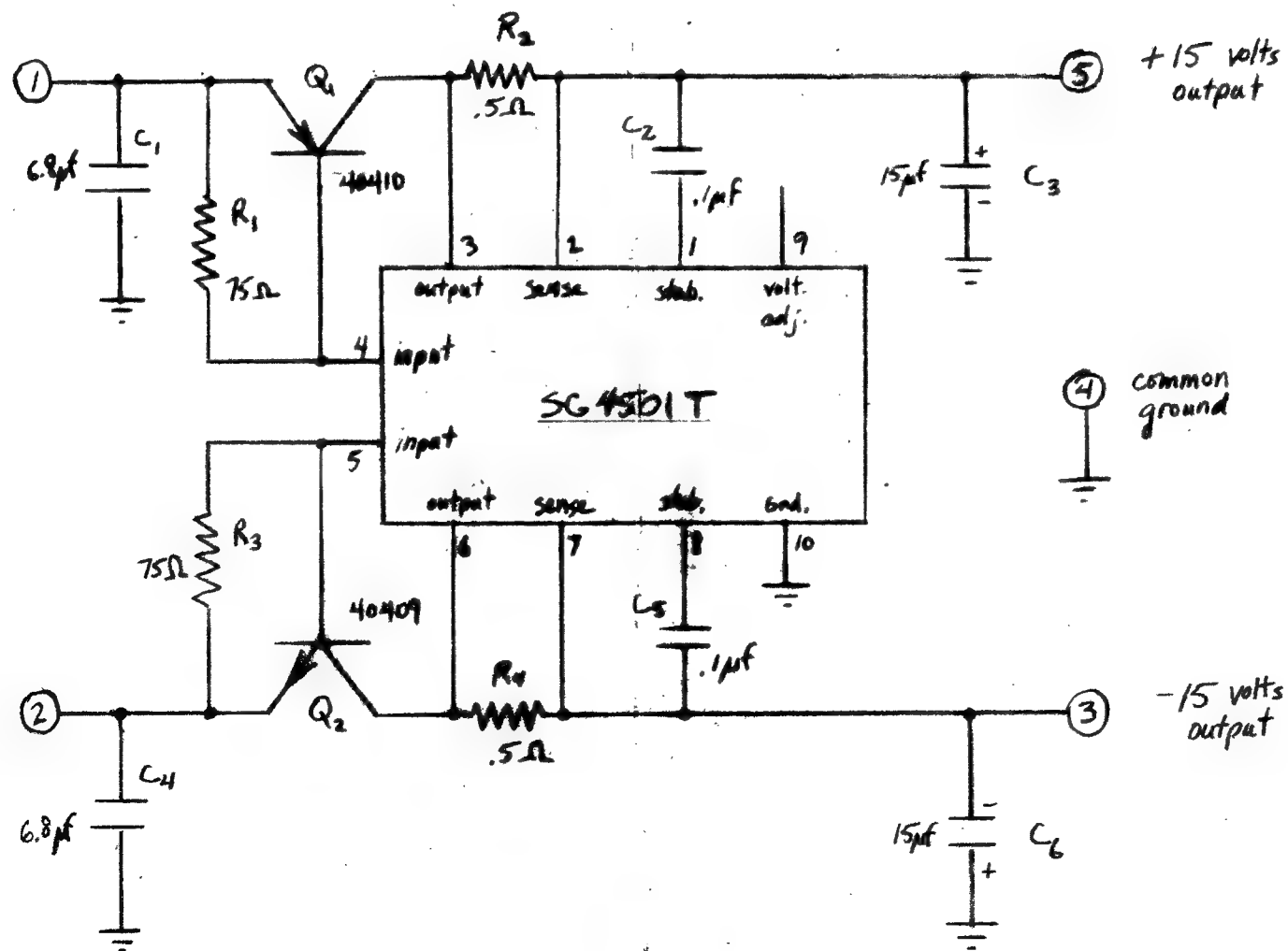


Top View

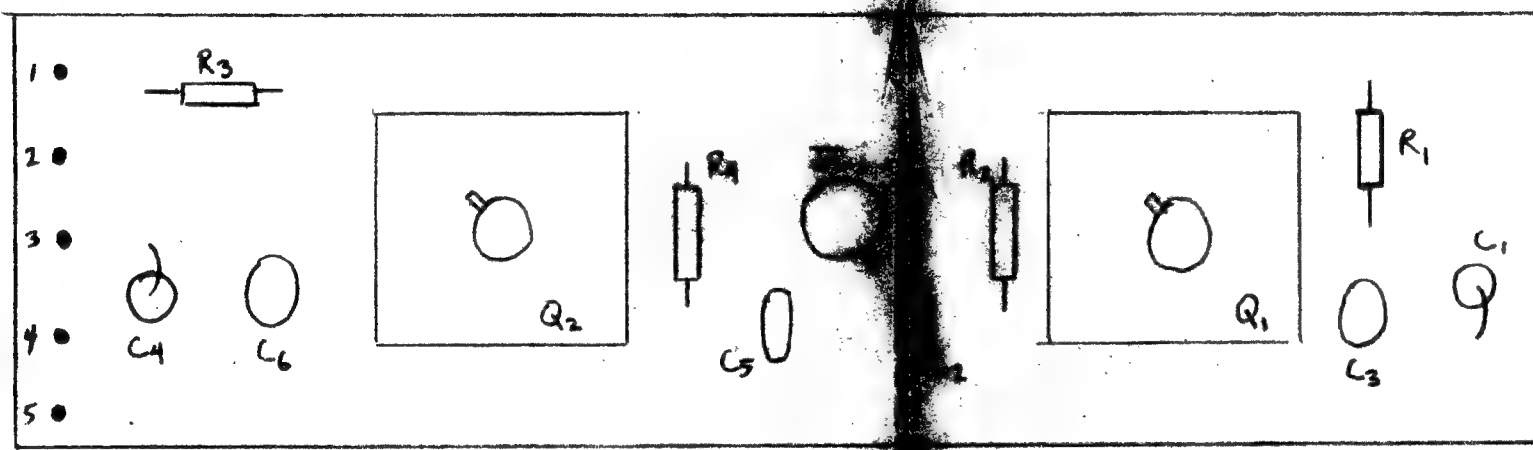


PC 105 -  
power supply

PC 105  
 $\pm 15V$  REGULATED  
 POWER SUPPLY BOARD  
 (L JAMES)

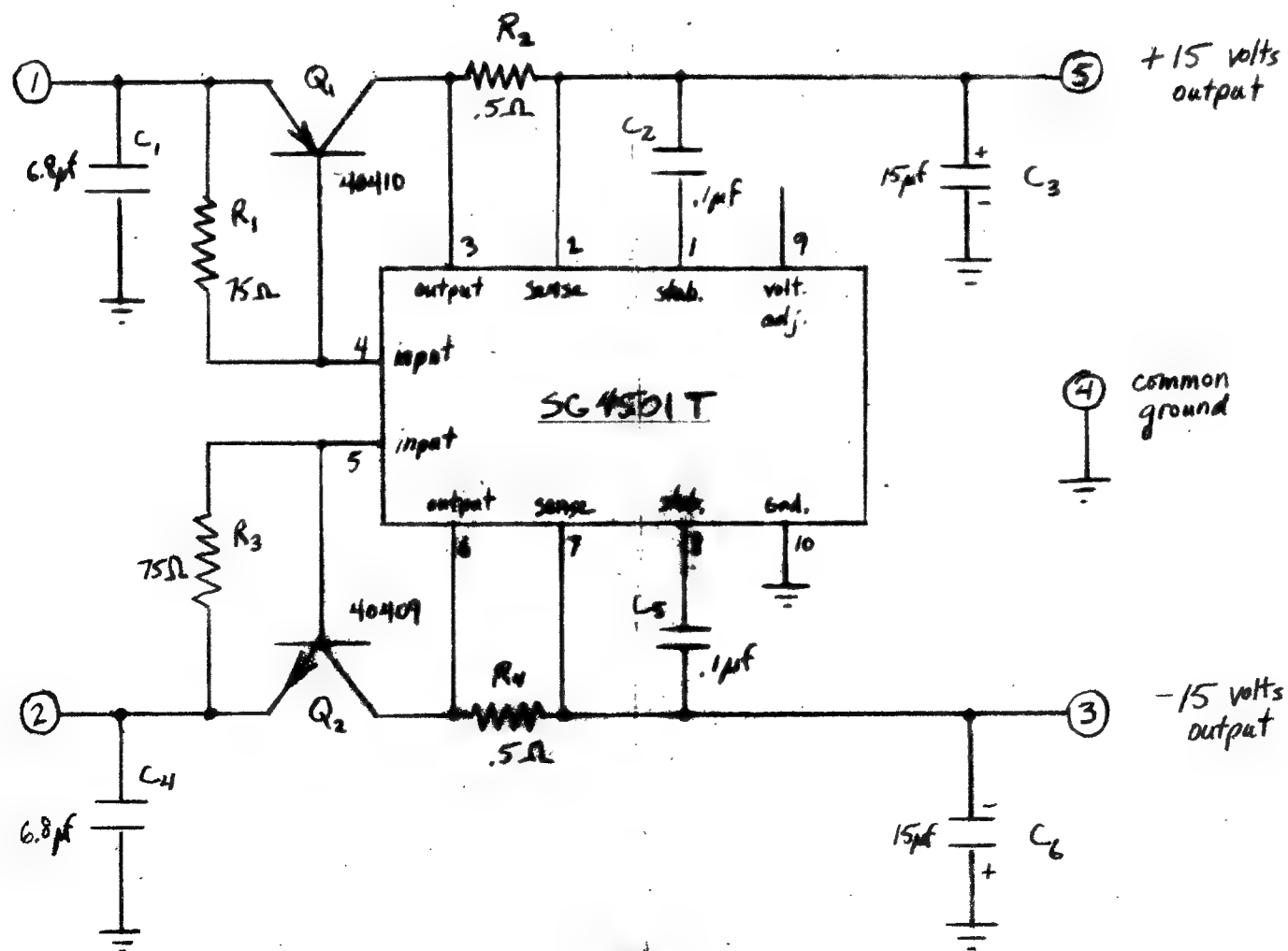


Top View

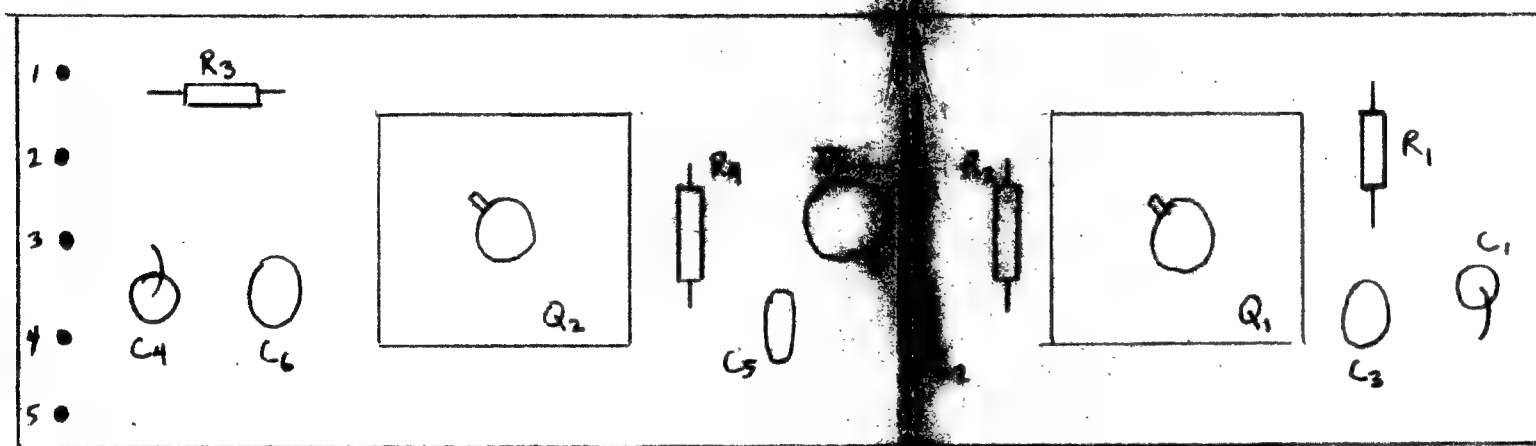


PC 105 -  $\pm 15V$  regulated  
 power supply board

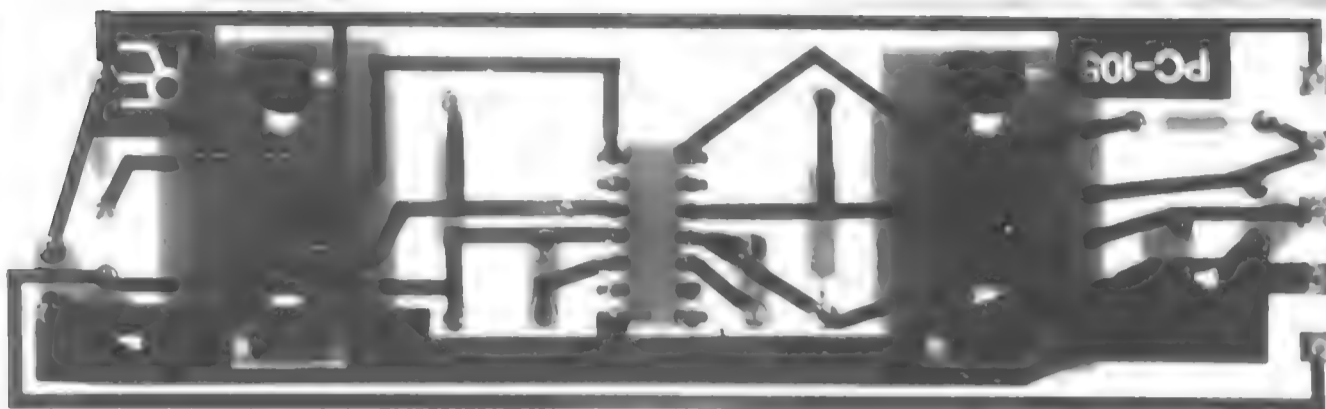
PC 105  
 $\pm 15V$  REGULATED  
 POWER SUPPLY BOARD  
 (L JAMES)



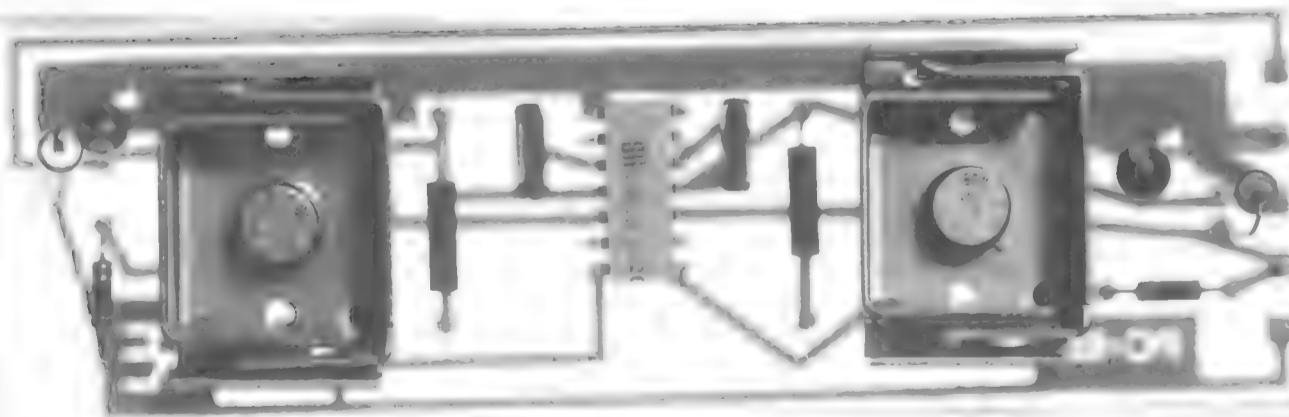
Top View



PC 105 -  $\pm 15V$  regulated  
 power supply board



+20 IN  
- 20 IN  
- 15 OUT  
GND  
+ 15 OUT

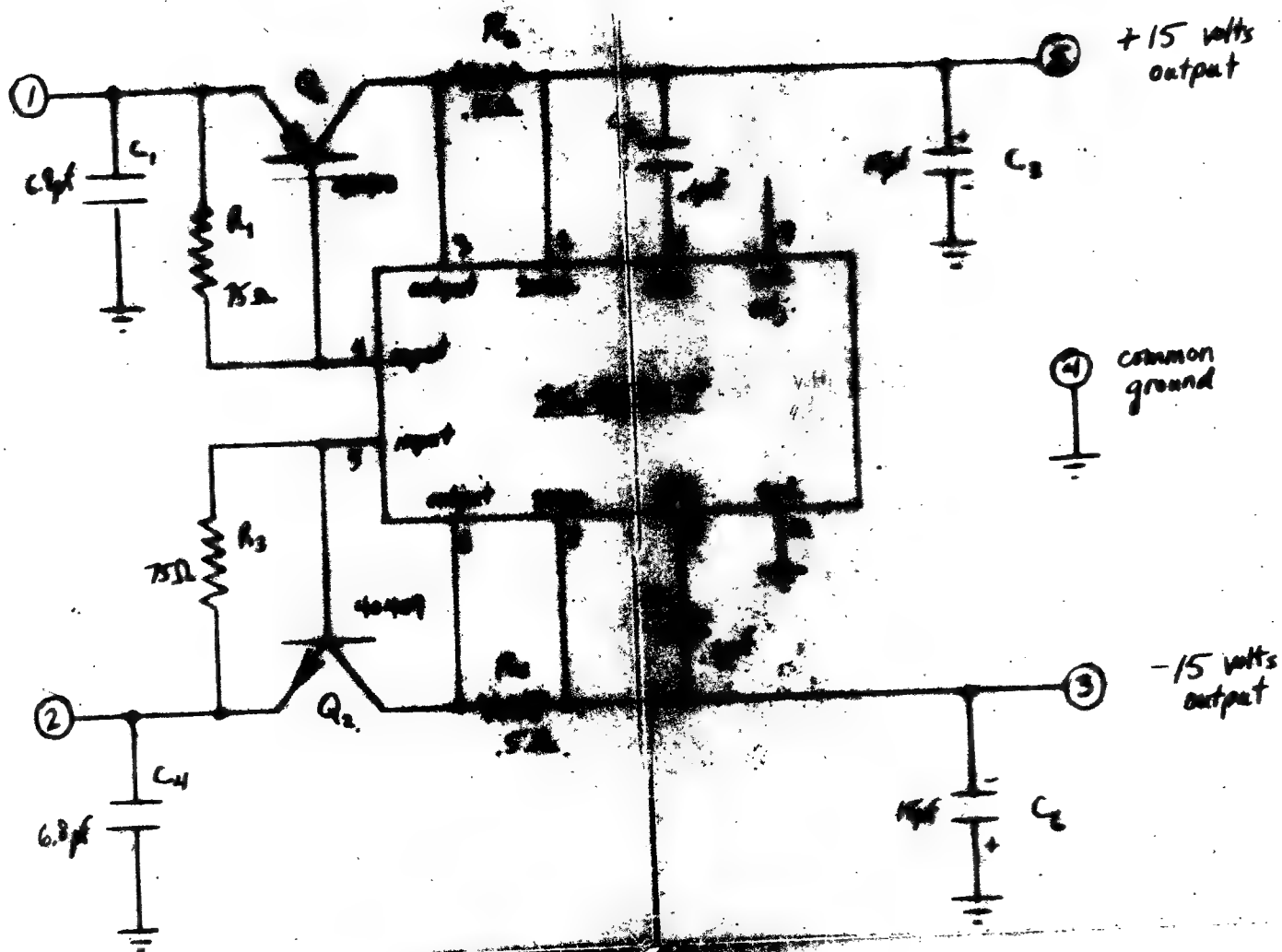


+ 15 OUT  
GND  
- 15 OUT  
- 20 IN  
+ 20 IN

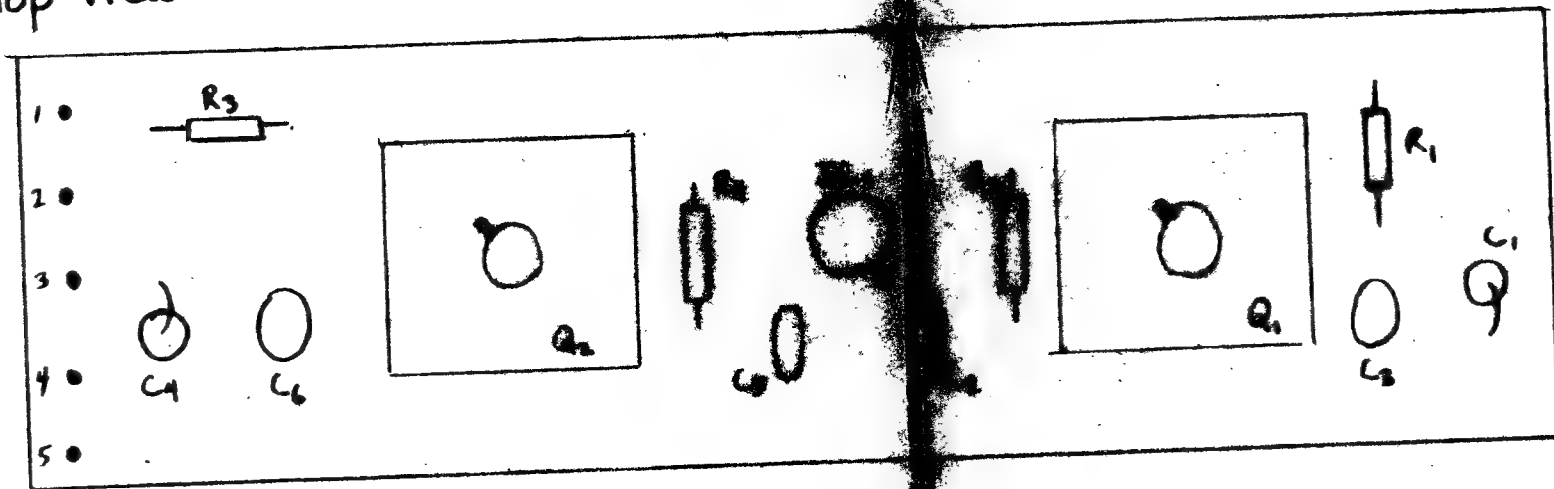
# PC 105

## $\pm 15V$ REGULATED POWER SUPPLY BOARD

(L JAMES)



Top View



PC 105 -  $\pm$   
power supply

PC-114

+ 50mA  
- 10mA

C-1 154 20V

C-2 154 20V

C-3 .14

C-4 .14

R-1 2.2K

R-2 4.7K

R-3 1K

R-4 4.7K

R-5 1K

R-6 5.6.52

R-7 11.52

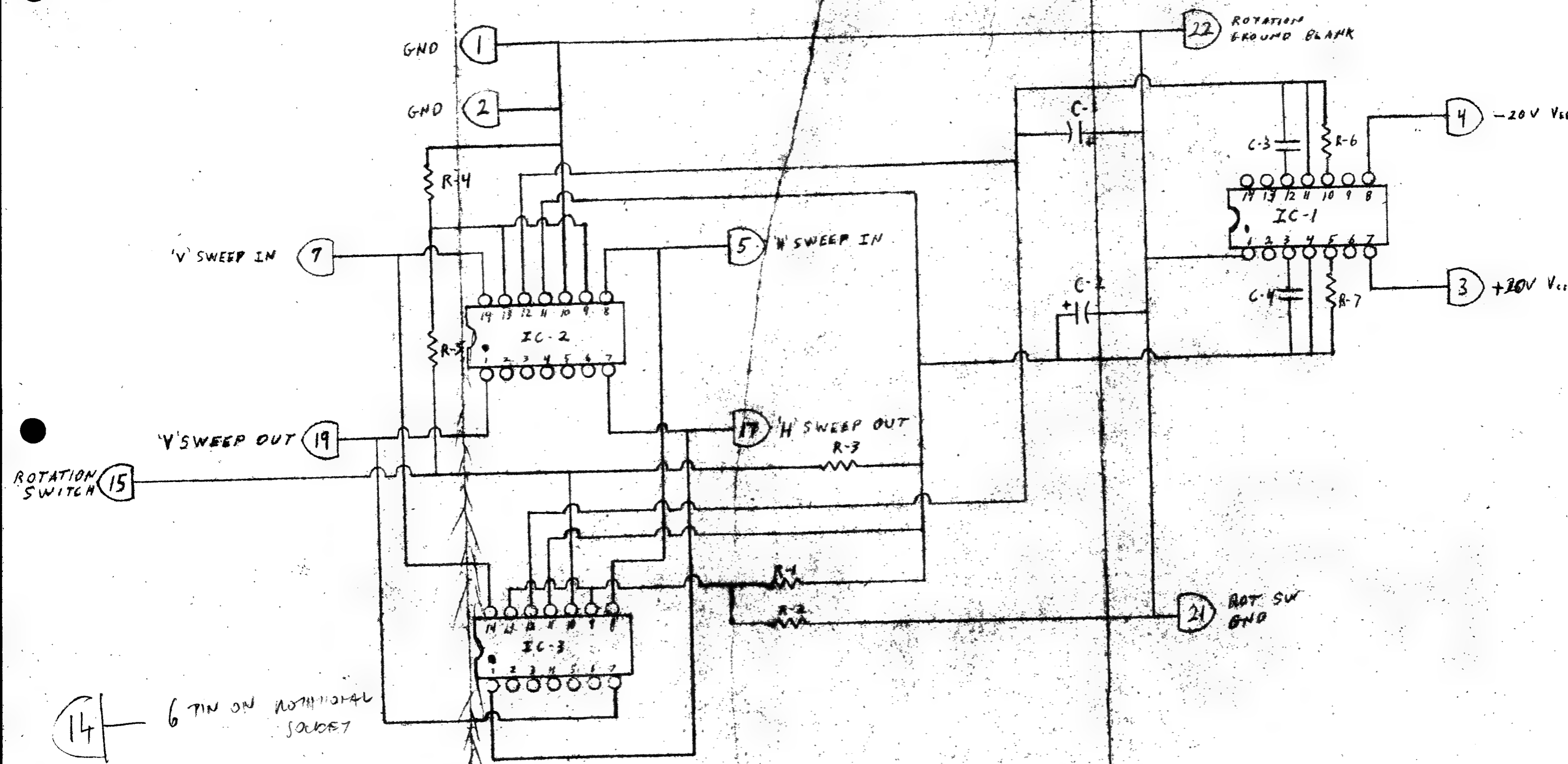
IC-1 SE4501 Regulator

AA0134CD PIC-2 AH FET ~~for~~

IC-3 11 11 4

HCS  
69

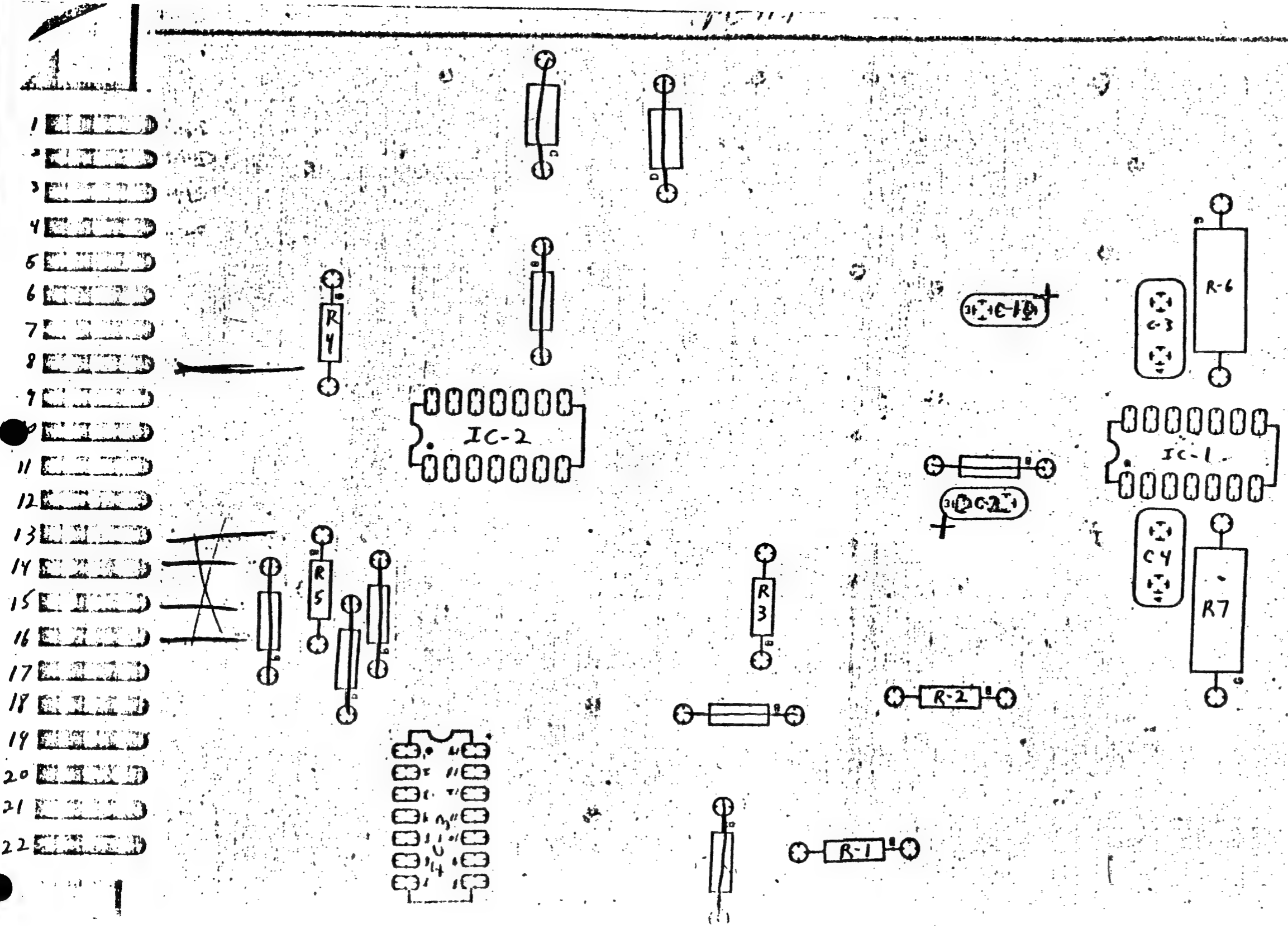
PRINT

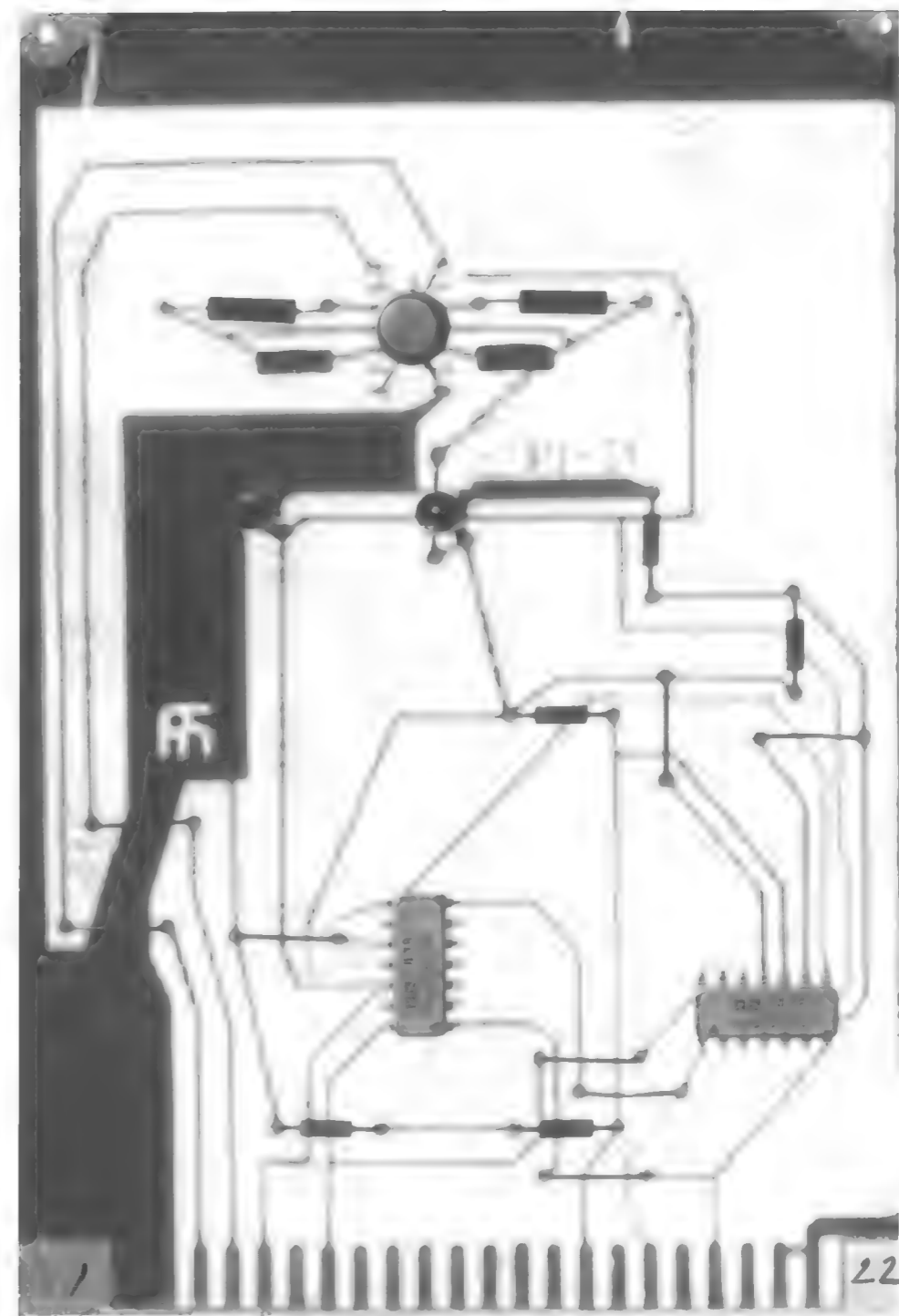
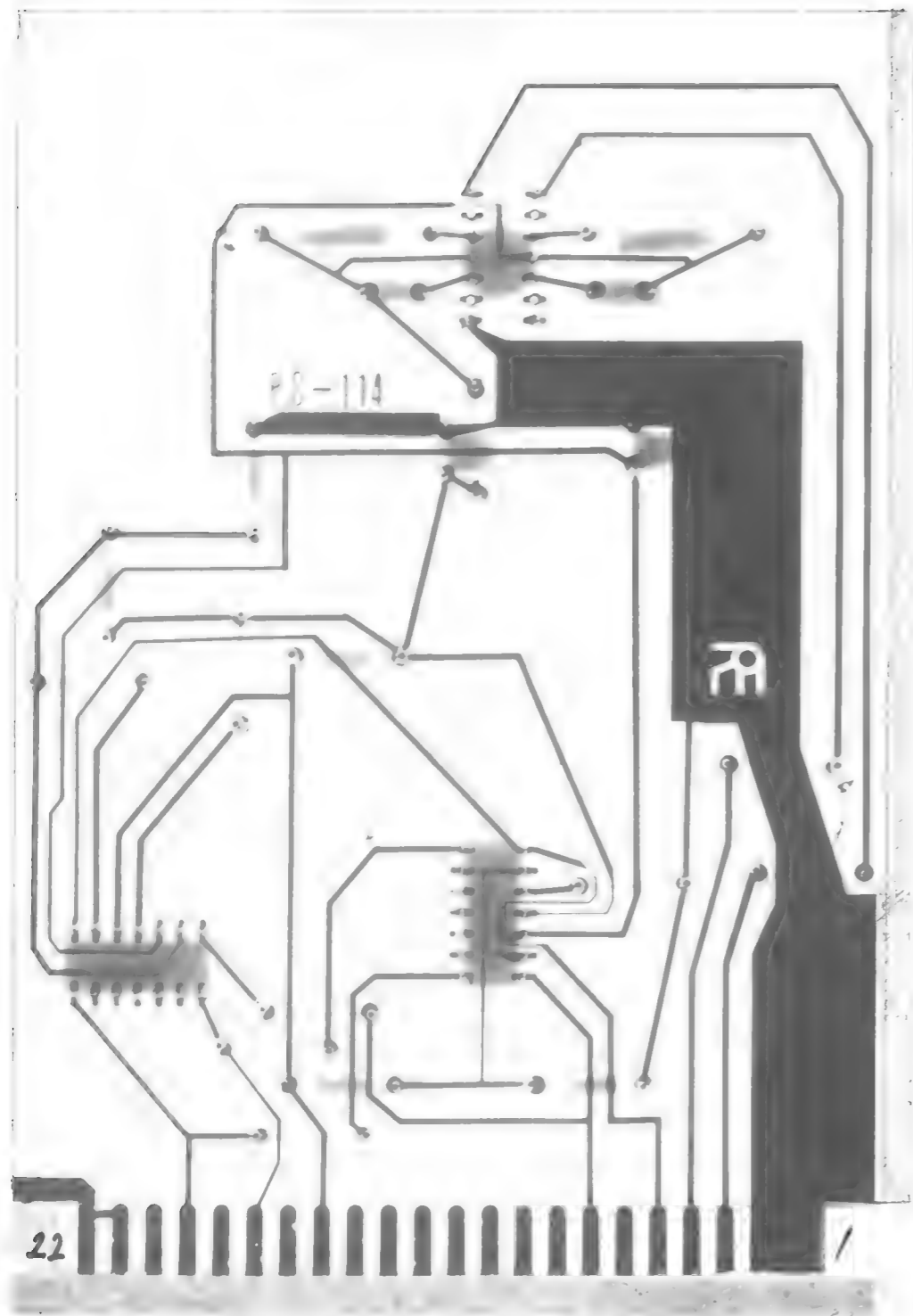


PC-114

PC-114

HCS  
53





PC-115 K

- Q-1 NPN
- Q-2 NPN
- Q-3 NPN
- Q-4 NPN
- Q-5 NPN
- Q-6 NPN
- Q-7 NPN
- Q-8 Pch FET
- Q-9 NPN
- Q-10 Pch FET 2N5462
- Q-11 Pch FET
- Q-12 Pch FET
- Q-13 NPN
- Q-14 40409
- Q-15 40410
- Q-16 Pch FET
- Q-17 Pch FET
- Q-18 Pch FET

+75 mA  
-20 mA

- IC-1 LM 319 COMP. ADP. WITH HEAT SINK
- IC-3 LM 318 OP-AMP
- IC-4 LM 319 COMP. ADP.
- IC-5 SG4501N REGULATOR
- IC-6 LM 318 OP-AMP
- D-1 IN914
- D-2
- D-3
- D-4
- D-5
- D-6
- D-7
- D-8
- D-9
- D-10
- D-11
- D-12
- D-13 9.1V ZENER
- D-14 9.1V ZENER

- C-1 100PF
- C-2 100PF
- C-3 100PF
- C-4 100PF
- C-5 100PF
- C-6 100PF
- C-7 .1uF CER
- C-8 .1uF
- C-9 .1uF
- C-10 .1uF
- C-11 .1uF
- C-12 .1uF
- C-13 100PF
- C-14 100PF
- C-15 5PF
- C-16 .1uF
- C-17 .1uF
- C-18 .1uF
- C-19 15uF 20V TAN
- C-20 15uF 20V TAN
- C-21 .1uF
- C-22 .1uF
- C-23 .1uF
- C-24 10uF 25V
- C-25 10uF 25V
- C-26 100PF
- C-27 .1uF
- C-28 .1uF
- C-29 .1uF
- C-30 .1uF
- C-31 15uF 20V TAN
- C-32 15uF 20V TAN
- C-33 .1uF

- R-1 100K
- R-2 5.6K
- R-3 4.7K
- R-4 2.2K
- R-5 2.2K
- R-6 15K
- R-7 15K
- R-8 15K
- R-9 15K
- R-10 15K
- R-11 15K
- R-12 2.2K
- R-13 2.2K
- R-14 50K 47K
- R-15 50K 47K
- R-16 120K
- R-17 150K
- R-18 50K 47K
- R-19 50K 47K
- R-20 4.7K
- R-21 4.7K
- R-22 7552
- R-23 50K 47K
- R-24 50K 47K
- R-25 15K
- R-26 15K
- R-27 15K
- R-28 15K
- R-29 8.2K
- R-30 8.2K
- R-31 50K 47K
- R-32 1K
- R-33 1K
- R-34 6.8K
- R-35 7552
- R-36 10K
- R-37 7552
- R-38 15K
- R-39 15K
- R-40 15K
- R-41 50K 47K
- R-42 50K 47K
- R-43 20K POT
- R-44 20K POT

- R-47 7552
- R-48 5520
- R-49 5520
- R-50 33K
- R-51 15K
- R-52 15K
- R-53 15K
- R-54 15K
- R-55 15K
- R-56 15K
- R-57 15K
- R-58 15K
- R-59 7552
- R-60 6.8K
- R-61 100K
- R-62 1ME

- J-1
- J-2
- J-3
- J-4
- J-5

R-22 SET TP-1 FOR 150 mA + PULSE WITH DUAL TRACE INPUT OPEN + SECTION POT INPUT BETWEEN +3 + +7 VOLTS

R-43 SET TP-2 TO +10V +.4V -0

R-44 SET TP-3 TO -10V +0 -.4V

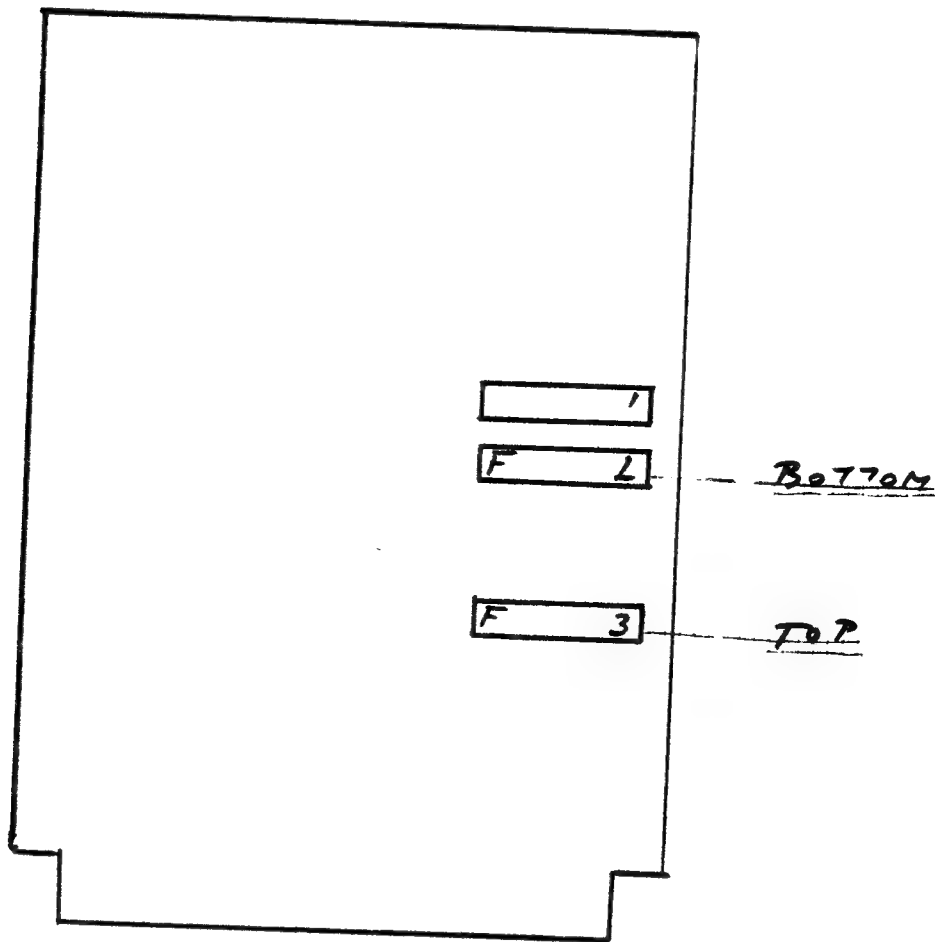
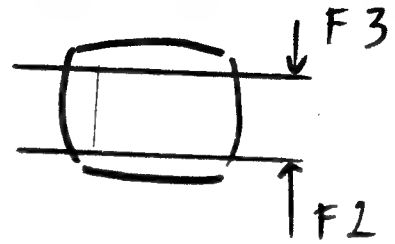
HCS 40

\* ADD 1MEG RESISTOR BETWEEN TP-1

\* ->

VERTICAL CENTER  
TOP/BOTTOM BLANKING ADJ.

PC 115

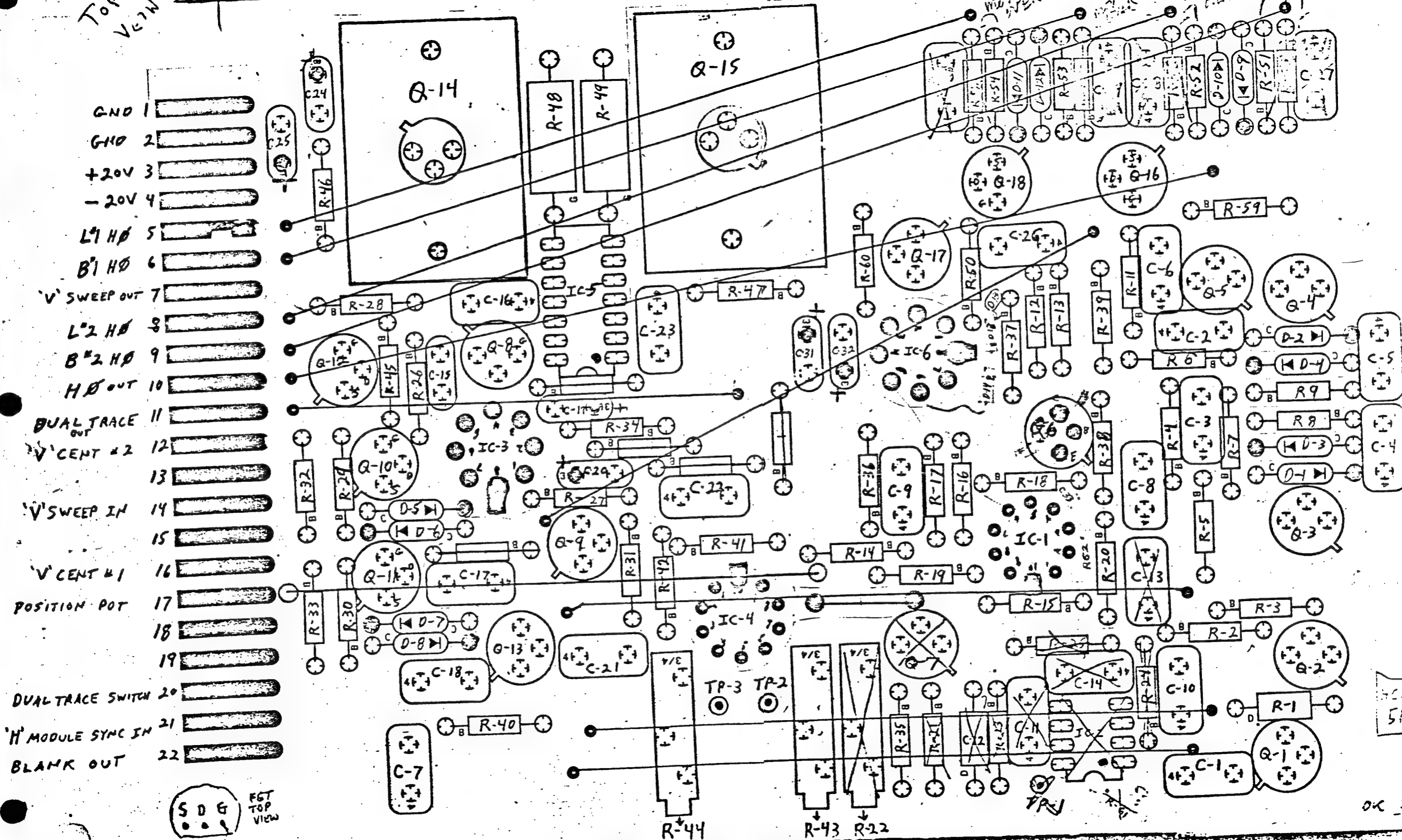


PC-115A

RUTT ELECTROPHYSICS

14 APRIL 1974

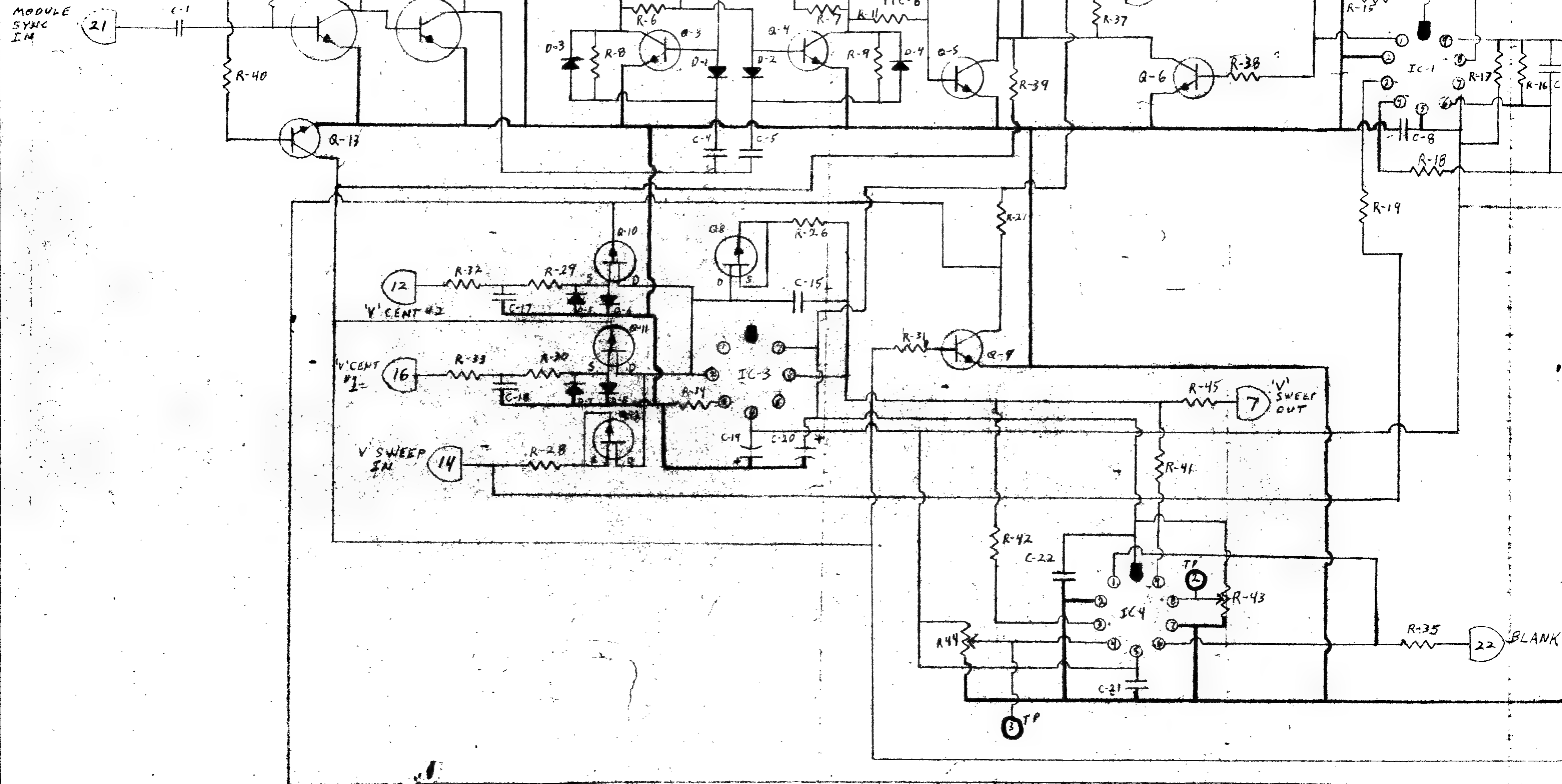
Top View

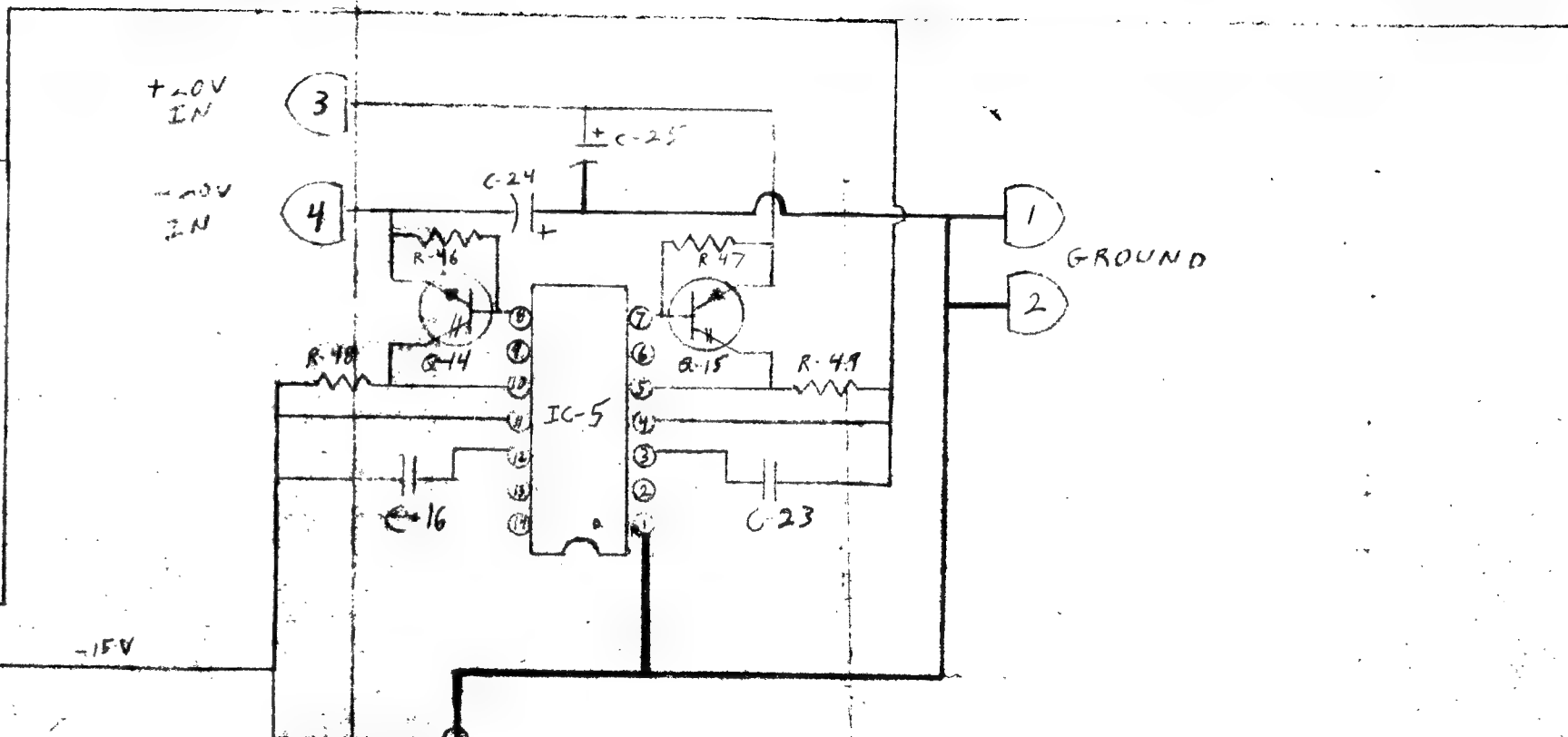
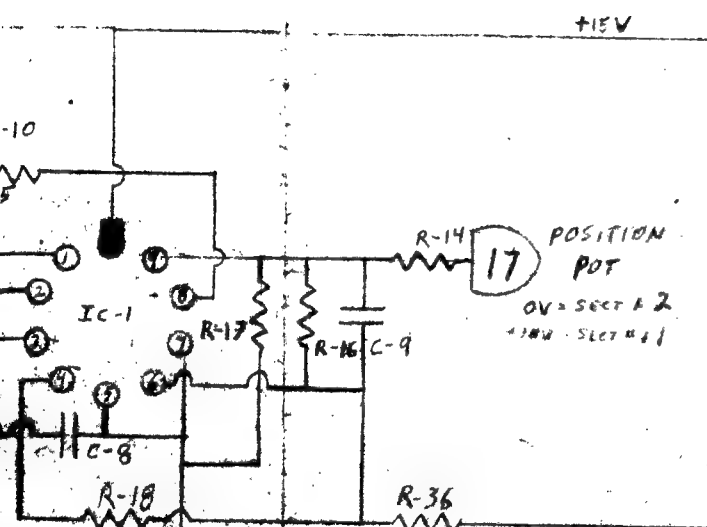


DUAL  
TRACE  
SWITCH

MODULE  
SYNC  
IN

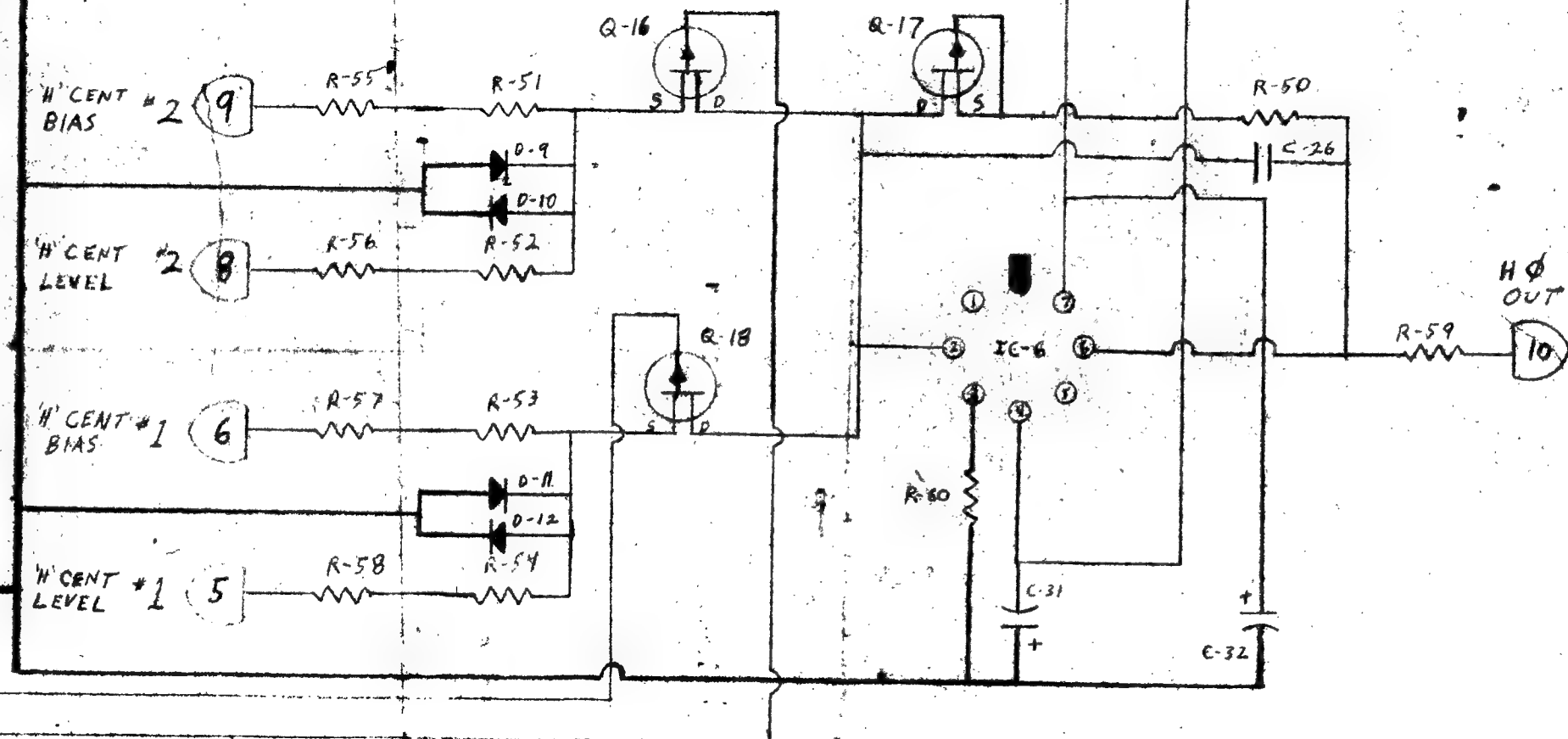
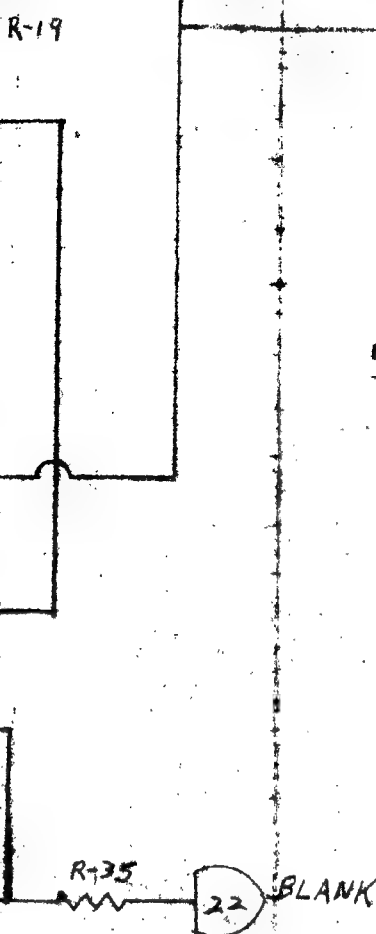
R-21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000

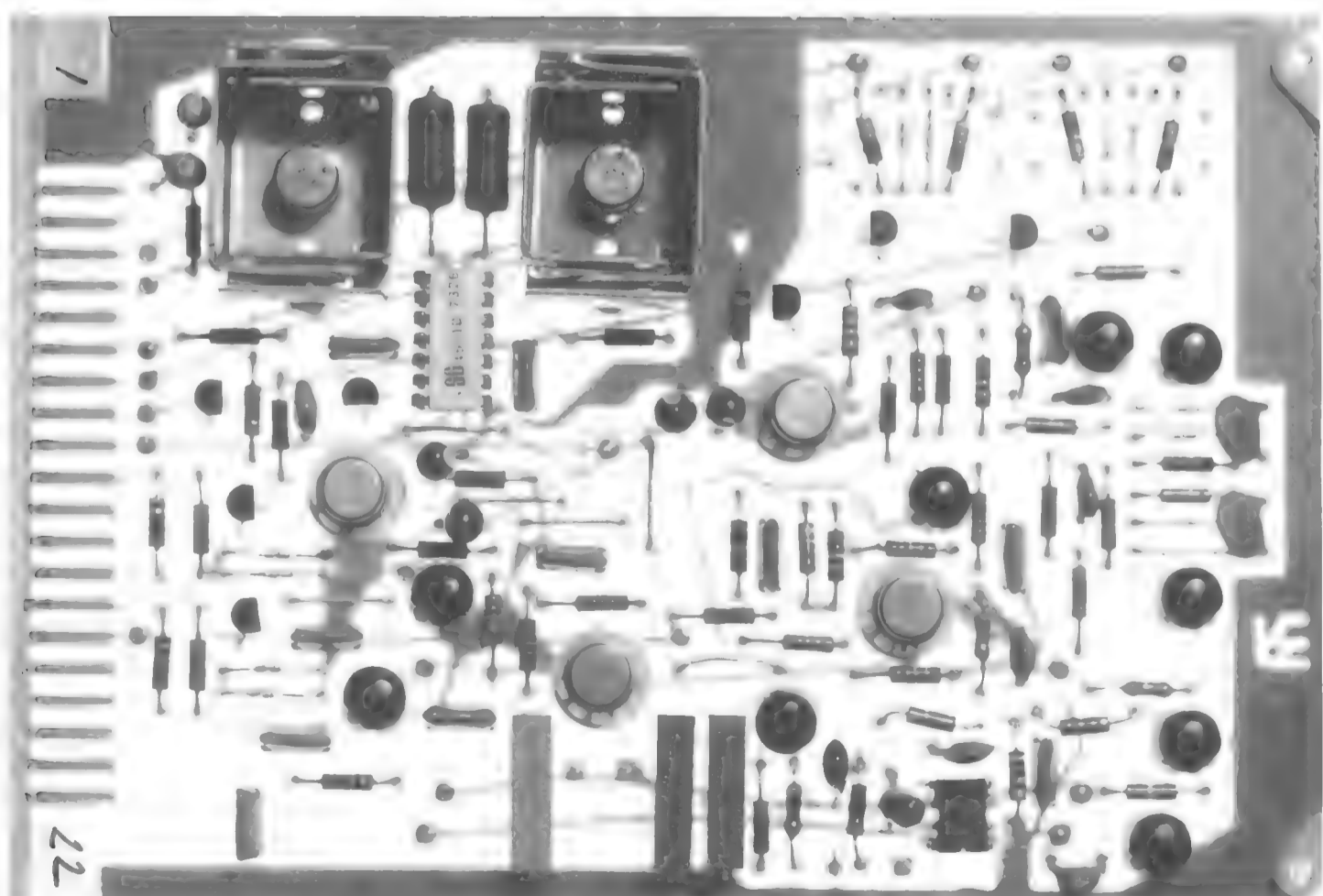
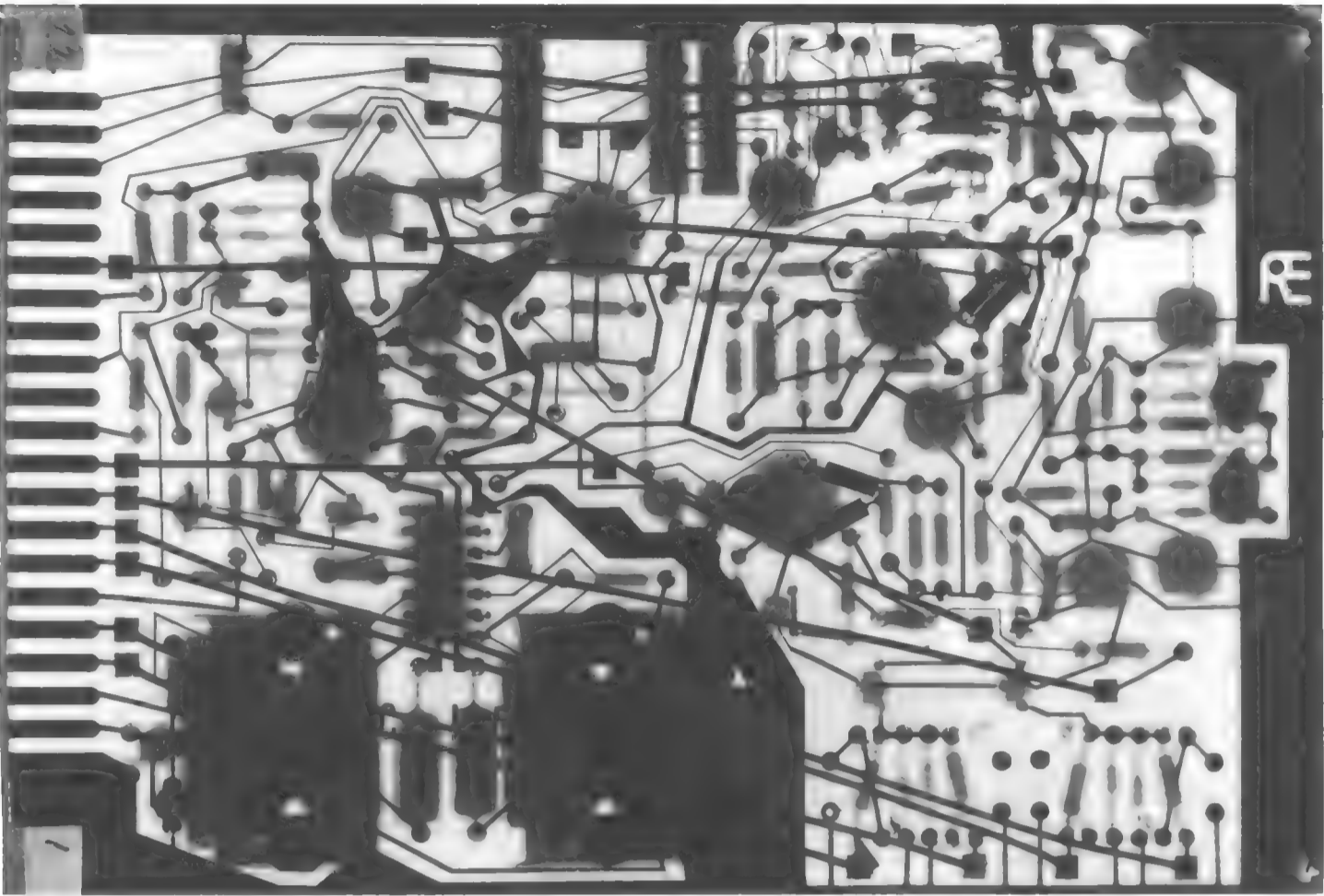




PC-115  
RUTT ELECTROPHYSICS  
APRIL 1974  
REVISED TO PC-115A

HCS  
24





TRONOTEC, INC.  
Church Road Laboratory  
Franklin, New Jersey

# PARTS LIST

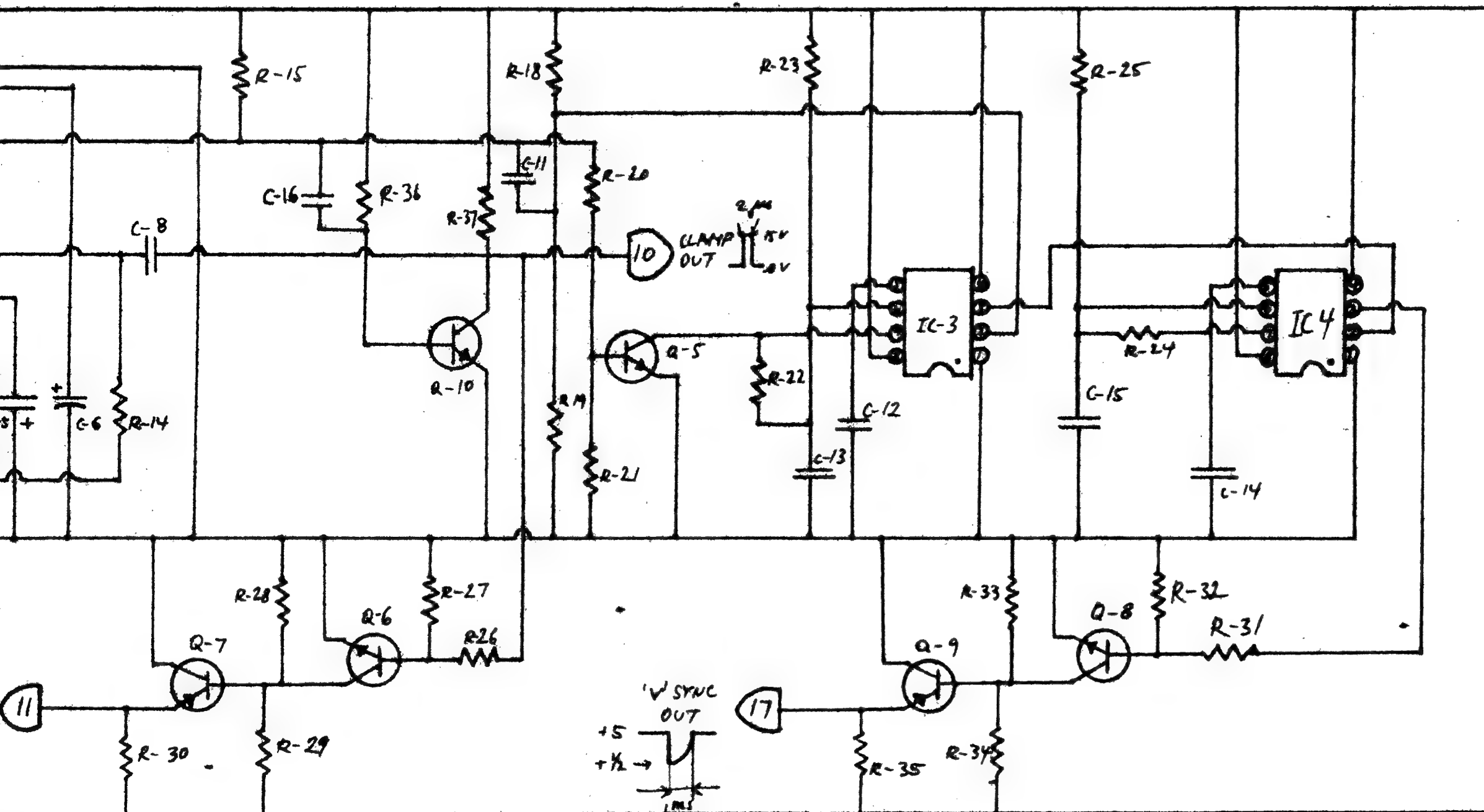
(ECO) DISPLAY

DATE 12/5/75 PROJECT RE 4 1/2 ASSY PC-116A DRAWING \_\_\_\_\_ SHEET 1 OF \_\_\_\_\_

REF	DESCRIPTION	MFR PART NR.	MFR.	TRONOTEC PM	QTY	UNIT	PRICE	TOTAL
IC-1	COMPARATOR	LM311	NSC		1			
IC 3,4	TIMER	NE 555V	SIG		2			
Q1,3,5,6, 8,10	NPN	2N3568			8			
Q2,7,9	PNP	2N3638A			3			
Q4	FET	2N4091			1			
DI,2	DIODE, SILICON, SIGNAL	1N914			2			
C1,3,5,6	Capacitor, Elec-Tant 15 $\mu$ F/20V				4			
C2,4,12, 14,15	" , Ceramic .1 $\mu$ F				5			
C7	" " 10pF				1			
C8	" Mylar 10 $\mu$ F				1			
C11	" Ceramic 100pF				1			
C13	" " 470pF				1			
C16	" " 220pF				1			
C17	" " 5pF				1			
R1,21,30, 32,35,27	Resistor - 1/4W, 5% 1K $\Omega$				6			
R2	" 270K				1			
R3	" 47K				1			

SHEET 2 OF

[illegible]



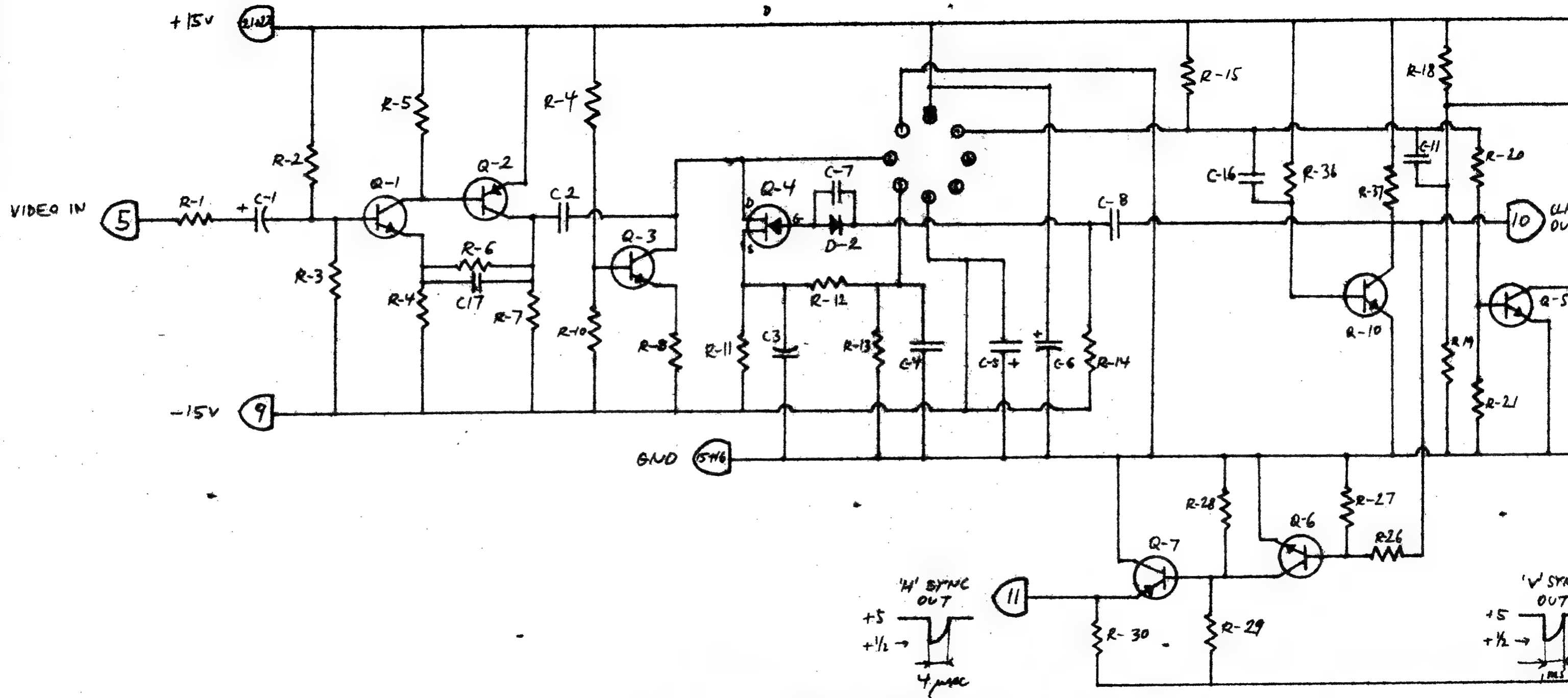
PC-116

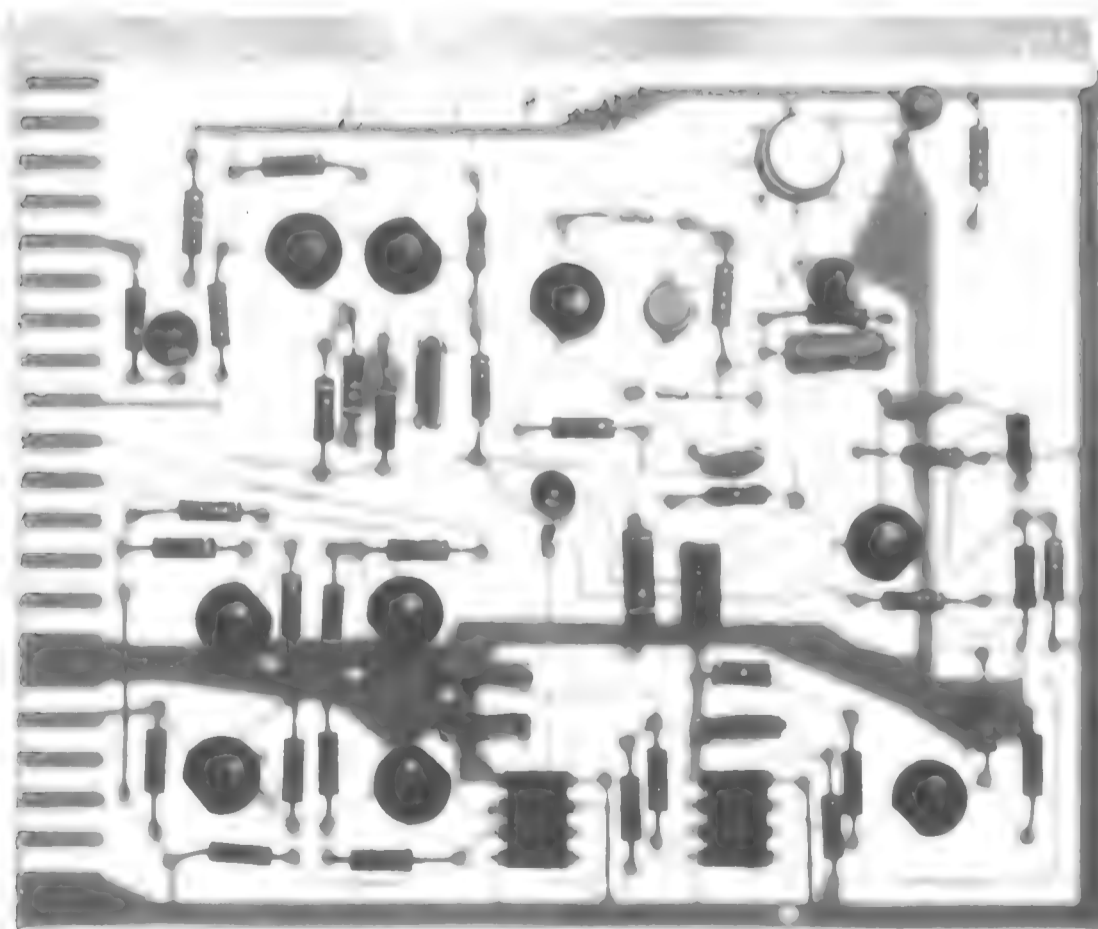
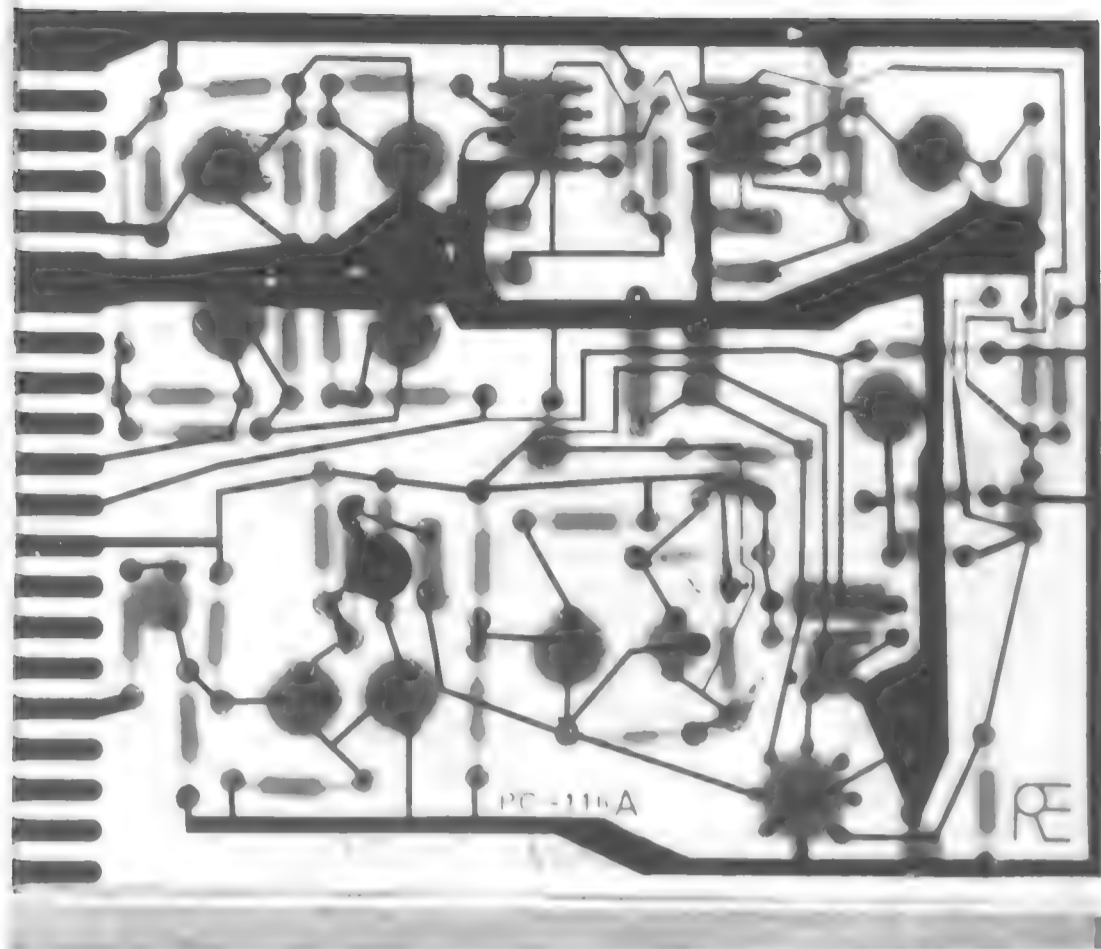
RUTT ELECTROPHYSICS

APR 1974

MODIFIED TO 116A

TOP VIEW  
6 — 5  
D





- Q-1 FET - 5462
- Q-2 FET
- Q-3 FET
- Q-4 NPN - 3568
- Q-5 PNP - 3638
- Q-6 NPN - 3568
- Q-7 40409
- Q-8 40410
- Q-9 FET
- Q-10 FET

+50mA  
 -20mA

- D-1 1N914
- D-2 " "
- D-3 9.1V ZENER
- D-4 1N914
- D-5 " "
- D-6 " "
- D-7 " "

~~TO~~  
~~TO~~  
~~TO~~

- IC-1 LM 318 OP-AMP
- IC-3 LM 318 OP-AMP
- IC-4 SG-4501M REGULATOR
- ~~IC-2 MC1494~~
- IC-2 MC1494 Dip

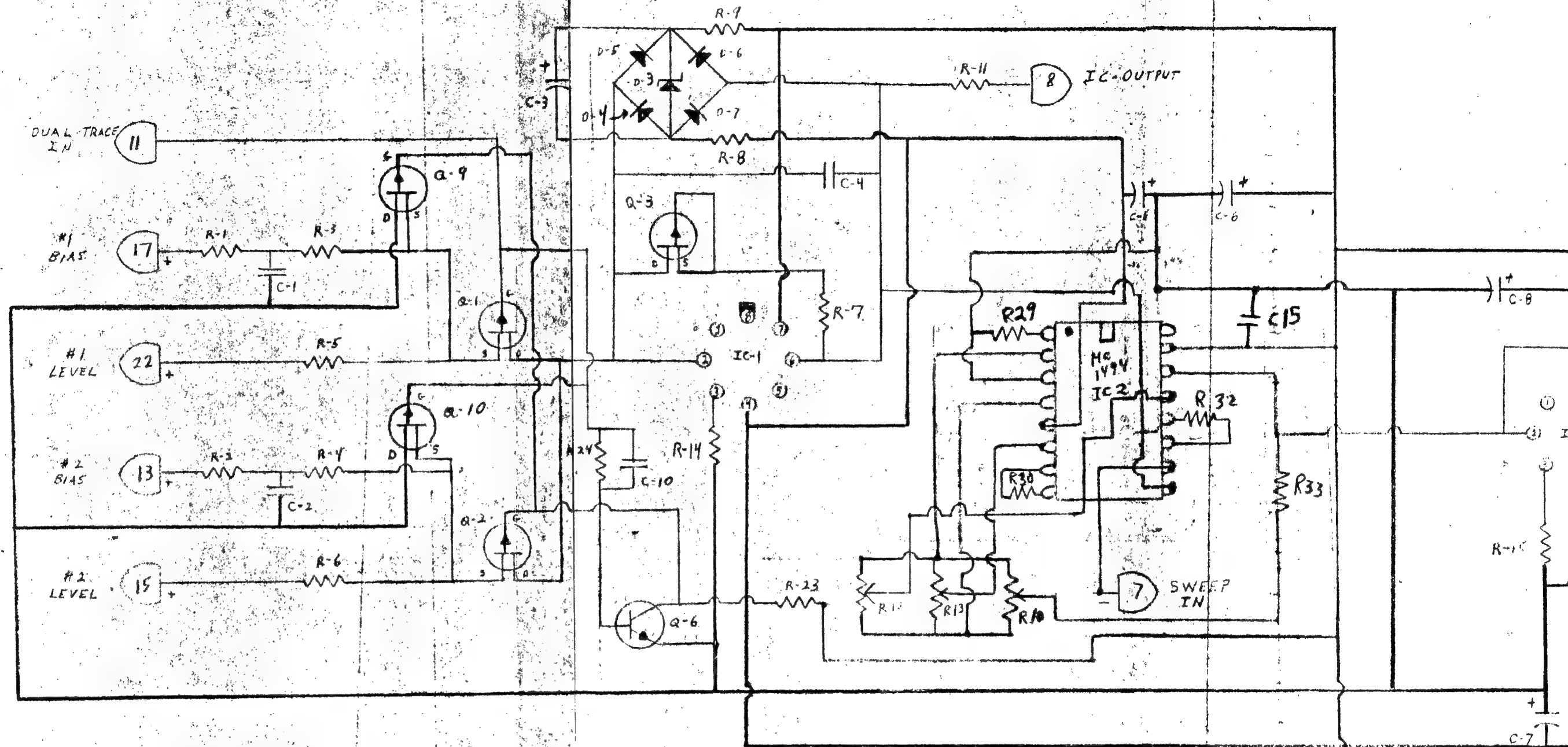
- R-10 OUTPUT OFFSET
- R-12 X.
- R-13 Y.
- R-16 SCALE FACTOR

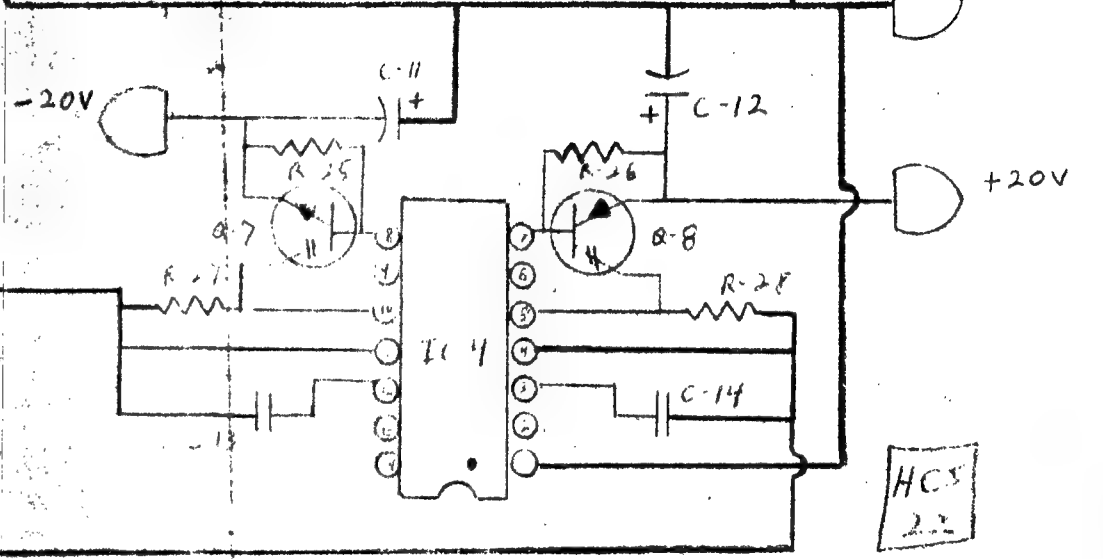
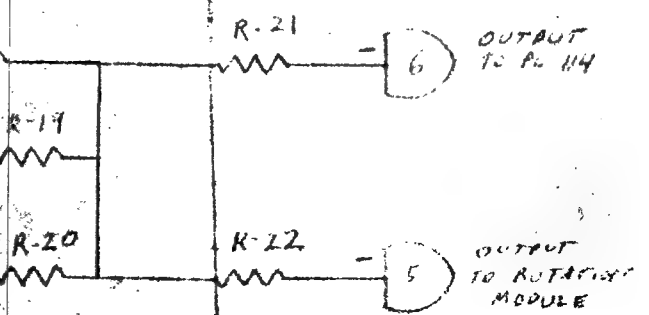
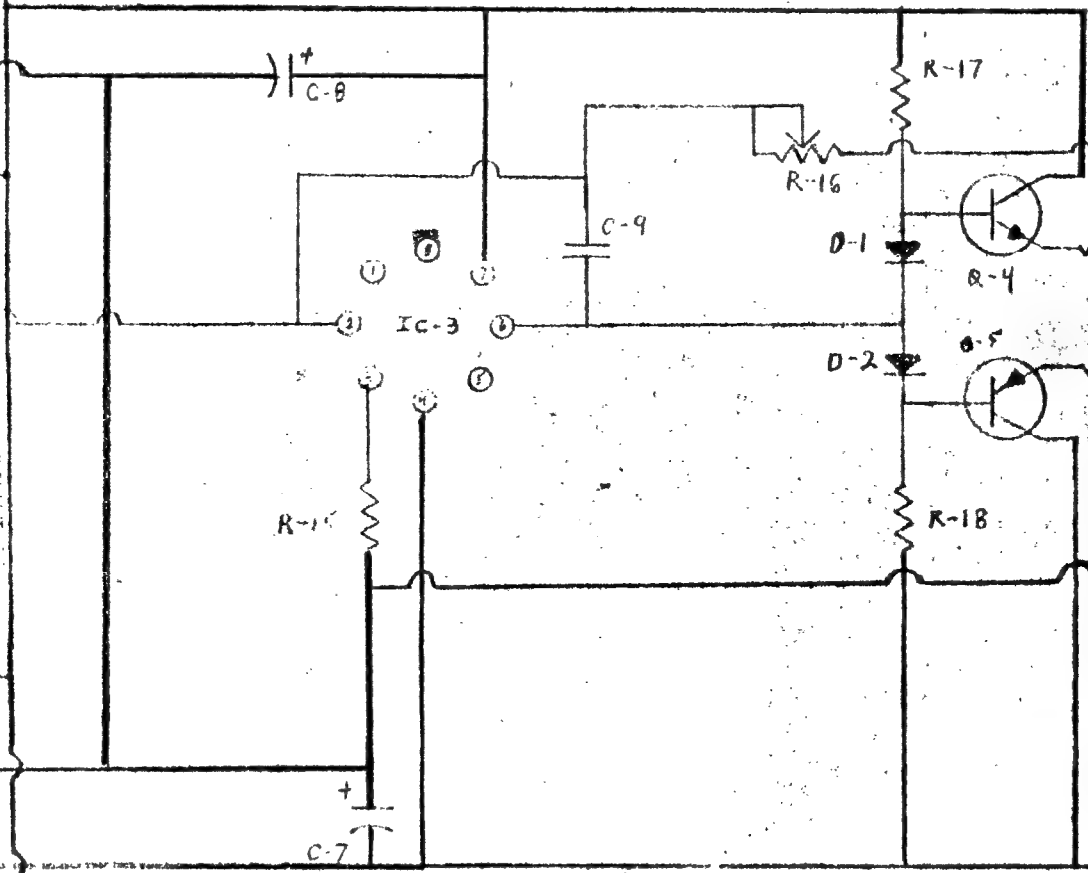
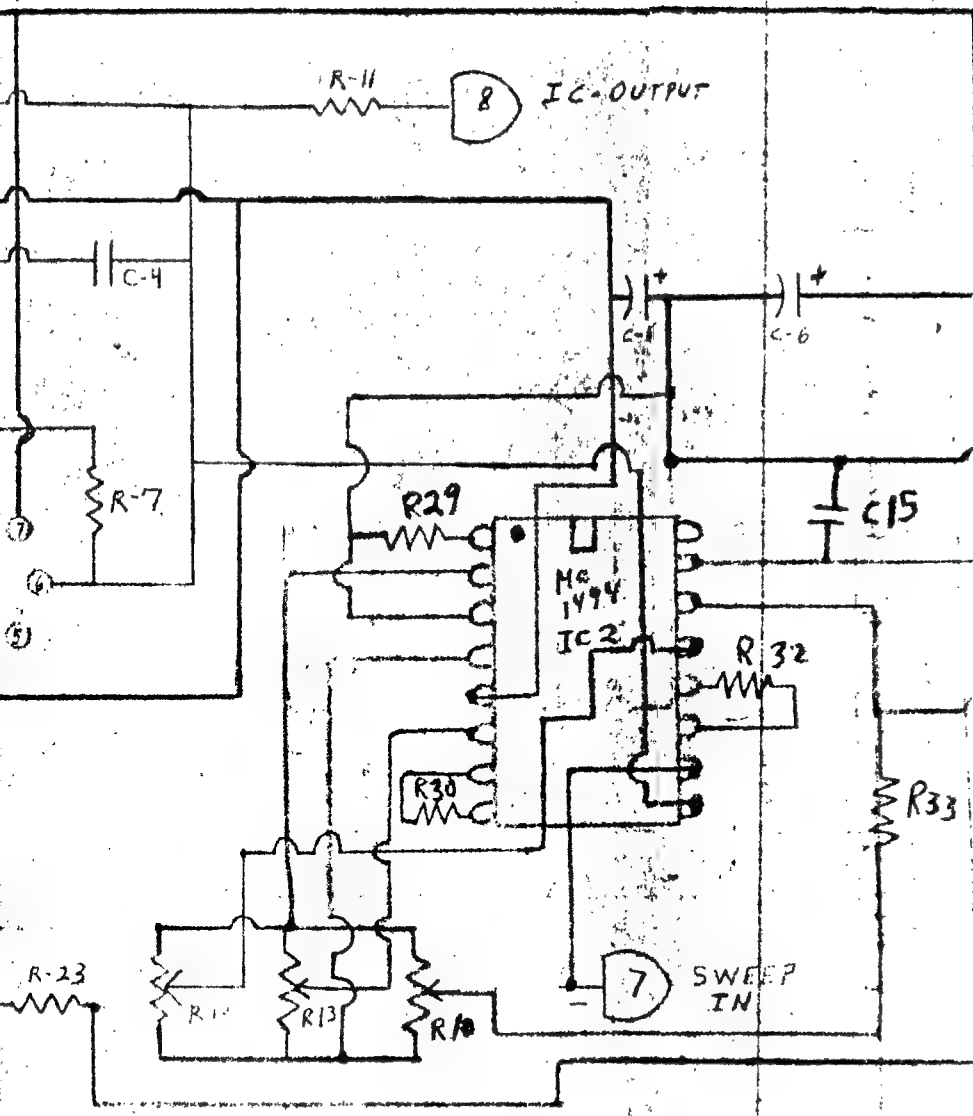
- C-1 .1u -
- C-2 .1u -
- C-3 15u 25V -
- C-4 5PF -
- C-5 15u 20V -
- C-6 15u 20V -
- C-7 15u 20V -
- C-8 15u 20V -
- ~~C-9 5PF~~
- C-10 100PF -
- C-11 10u 25V -
- C-12 10u 25V -
- C-13 .1u u -
- C-14 .1u u -
- C-15 .1 n -
- ~~C-16~~
- R-1 510u 2 -
- R-2 510u -
- R-3 4.7K 4 -
- R-4 4.7K -
- R-5 4.7K -
- R-6 4.7K -
- R-7 10K 4 -
- R-8 15K -
- R-9 15K -
- R-10 5K POT (20K) ✓
- R-11 1K +
- R-12 20K POT -
- R-13 20K POT -
- R-14 2.7K 1 -
- R-15 10K -
- R-16 ~~10K~~ 10K pot -
- R-17 10K -
- R-18 10K -
- R-19 4.7u -
- R-20 4.7u -
- R-21 75u 4 -
- R-22 75u -
- R-23 10K -
- R-24 33K 2 -
- R-25 75u -
- R-26 75u -
- R-27 .5u DALE
- R-28 .5u DALE
- R-29 12K
- R-30 ~~62K~~ 27K
- R-31 1K
- R-32 ~~15K~~ 15K
- R-33 ~~4.7K~~ 4.7K

WV 15

PC-117

HC5  
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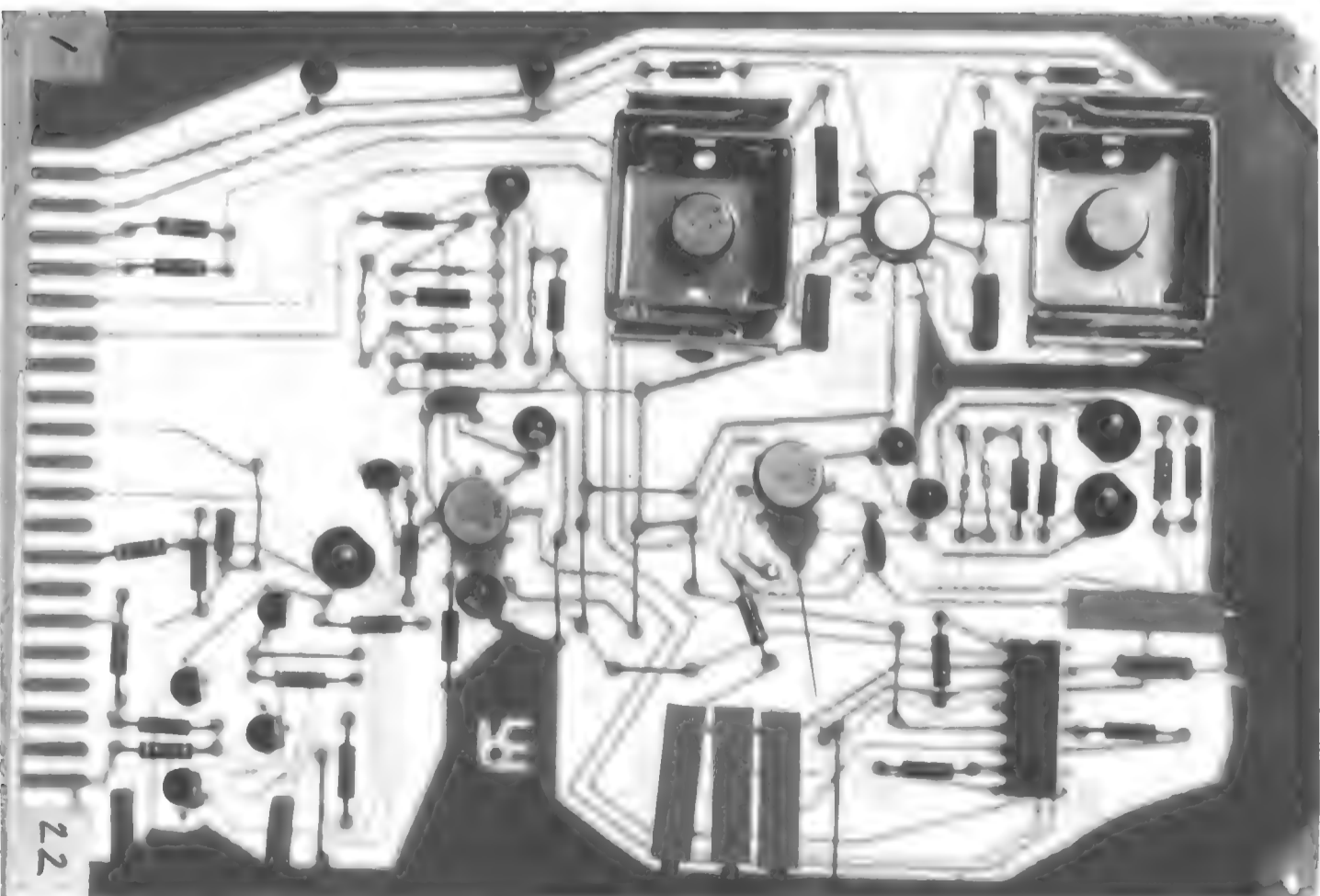
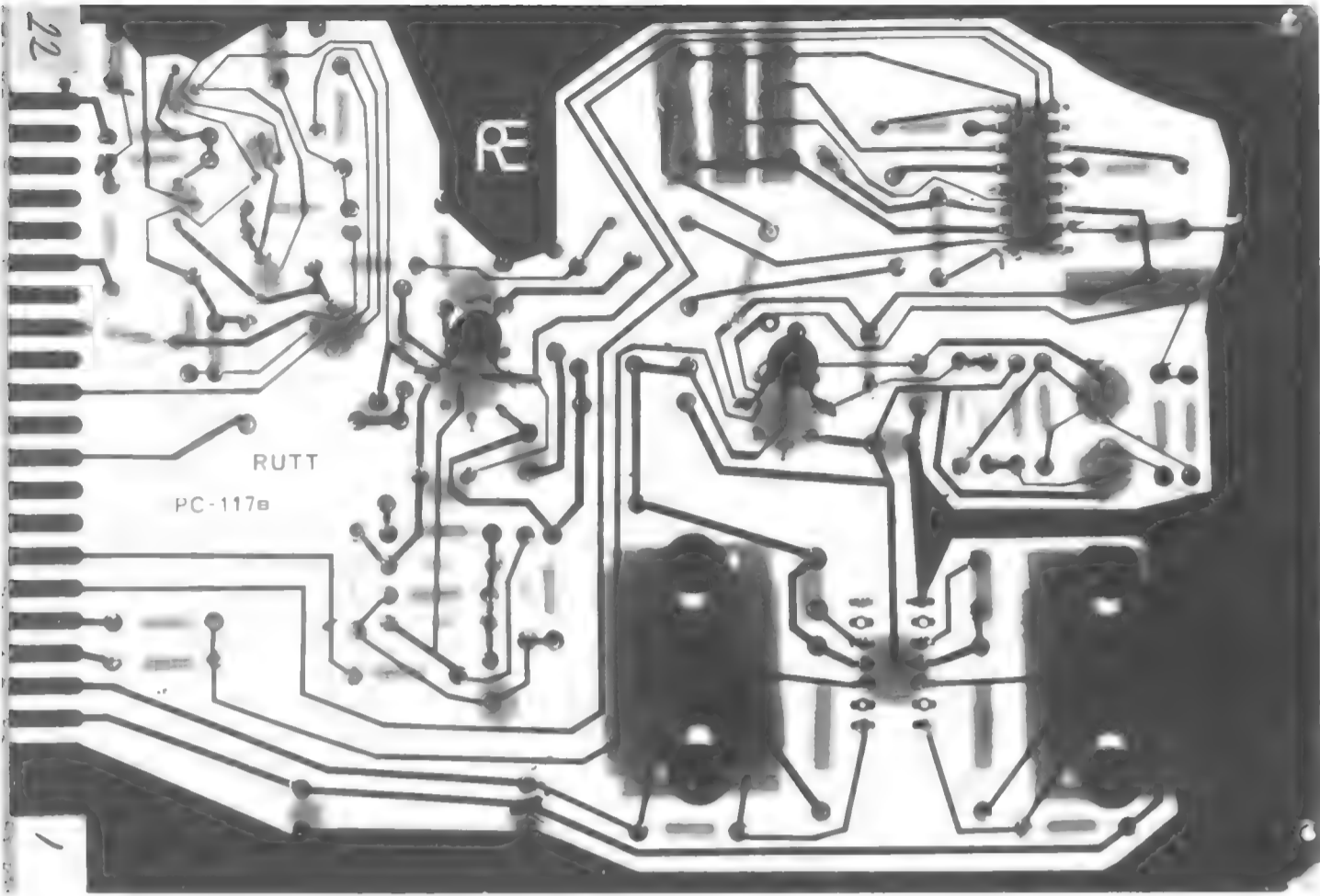




PC-117B  
RUTT ELECTROPHYSICS  
APRIL 1974

HCS  
2.2

25



IC-1 LM318

PC-118 AB

IC-2 ~~MC1494~~ MC1494 DIP

IC-3 SG-4501

+50 mA  
-15 mA

Q1 40409

Q2 40410

Q3 NPN 3569

Q4 PNP 3633

Q5 FET 2N5462

Q6 FET "

Q7 FET "

Q8 FET "

Q9 NPN 3568

C-1 .1  $\mu$  F  
C-2 .1  $\mu$  F  
C-3 5PF  
C-4 6.8/35V  
C-5 6.8/35V  
C-6 15  $\mu$  20V TAN  
C-7 "  
C-8 "  
C-9 "  
C-10 .1  $\mu$  F  
C-11 .1  $\mu$  F  
C-12 .1  $\mu$  F  
C-13 100PF

C14 .1 Ceramic

C15 .1 Ceramic

C16 10PF

C17 10PF

R1 .52 D.I.C  
R2 .52 D.I.C  
R3 75  $\Omega$  -  
R4 75  $\Omega$  -  
R5 4.7  $\Omega$  -  
R6 4.7  $\Omega$  -  
R7 75  $\Omega$  -  
R8 100K POT

R9 10K -

R10 10K -

R11 5K POT (20K)

R12 20K POT

R13 20K POT

R14 10K -

R15 10K -

R16 10K -

R17 4.7K -

R18 4.7K -

R19 4.7K -

R20 4.7K -

R21 560  $\Omega$  -

R22 560  $\Omega$  -

R23 100K -

R24 10K -

R25 10K -

R26 10K -

R27 10K -

R28 10K -

R29 10K -

R30 10K -

R31 10K -

R32 10K -

R33 10K -

R34 10K -

R35 10K -

R36 10K -

R37 10K -

R38 10K -

R39 10K -

R40 10K -

R41 10K -

R42 10K -

R43 10K -

R44 10K -

R45 10K -

ADD 100K IN SERIES WITH R8

TO CONFORM TO NEW DESIGN

D1 1N914

D2 "

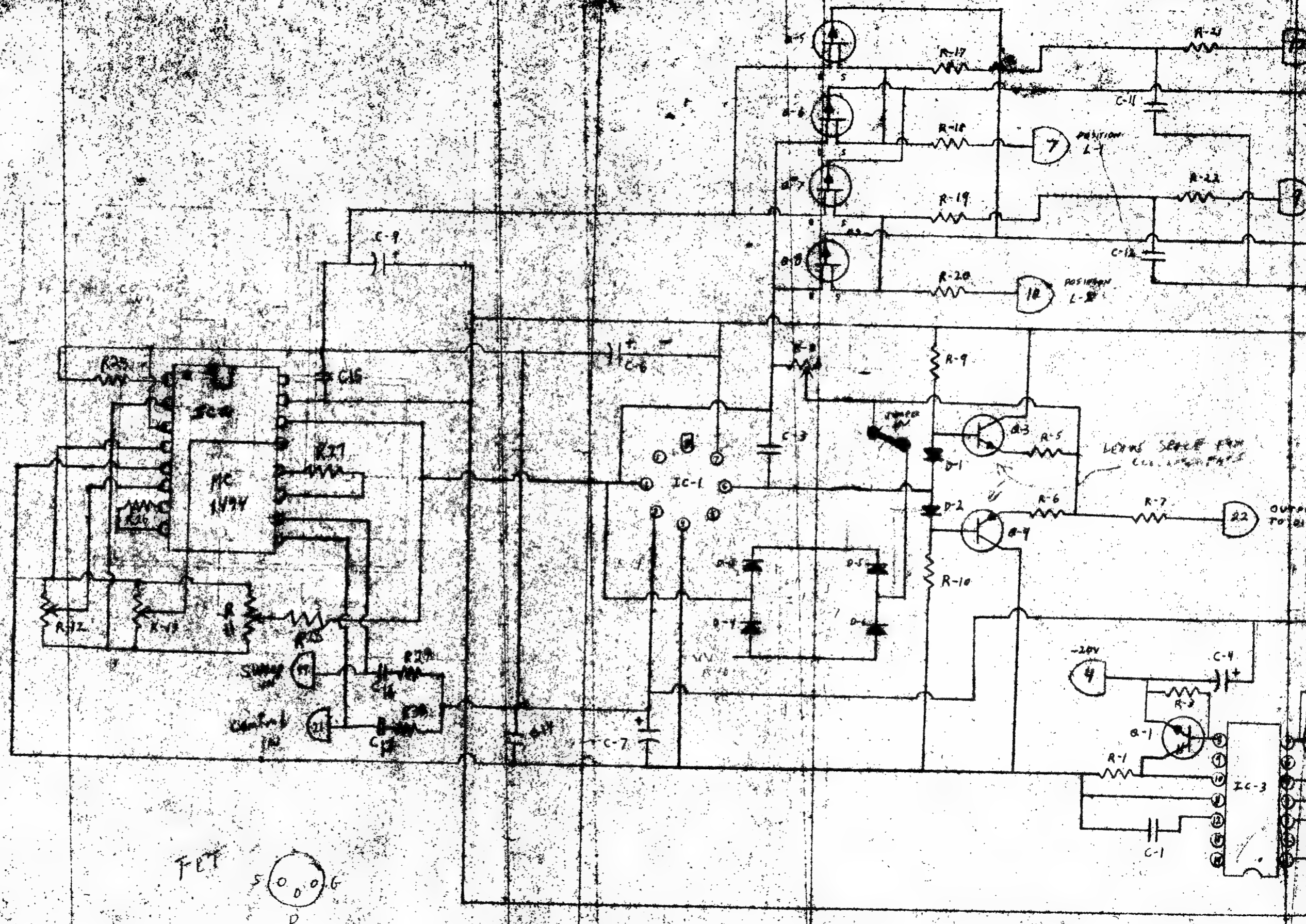
D3 "

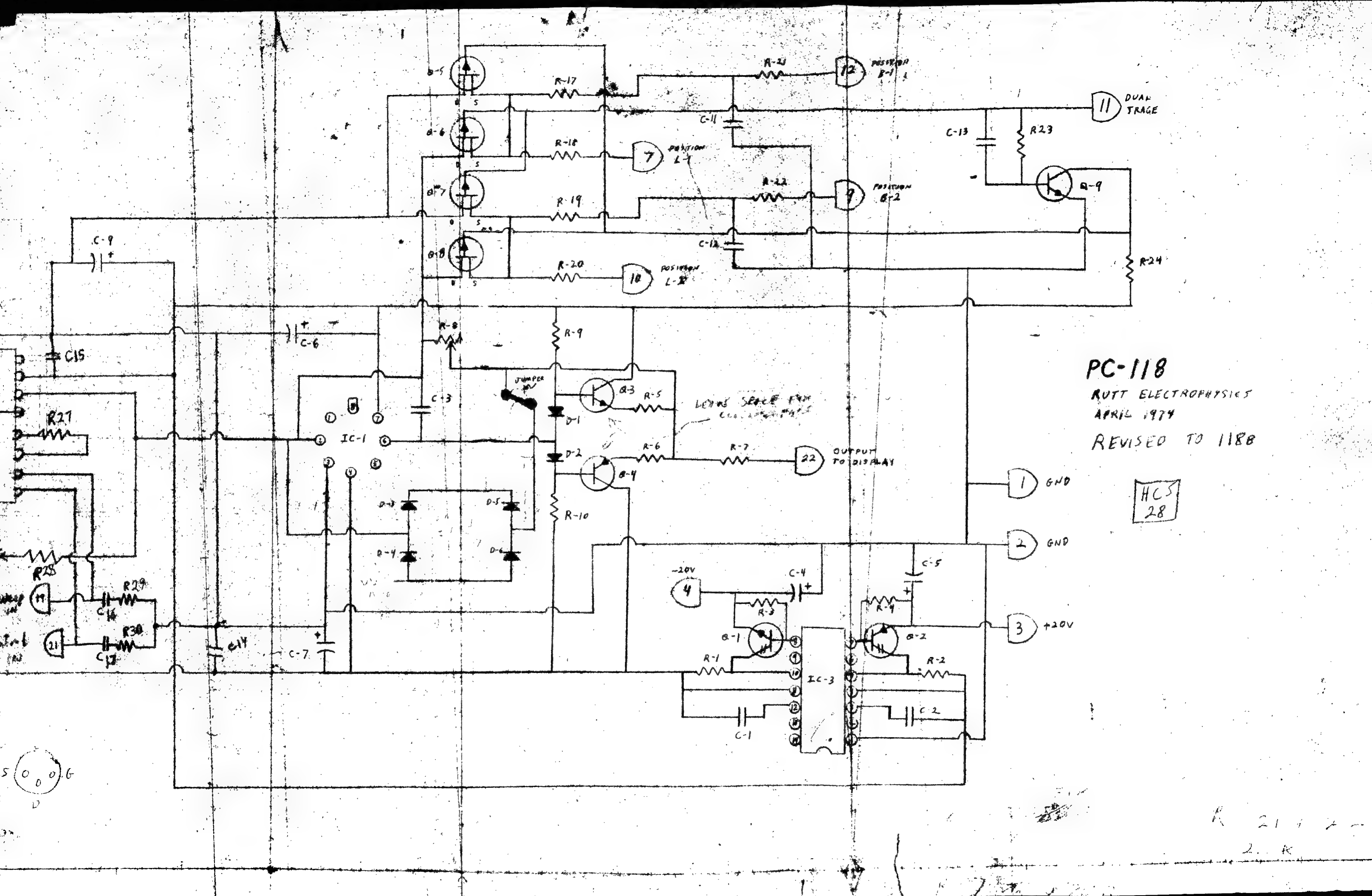
D4 "

D5 9-1V Zener

D6 9-1V Zener

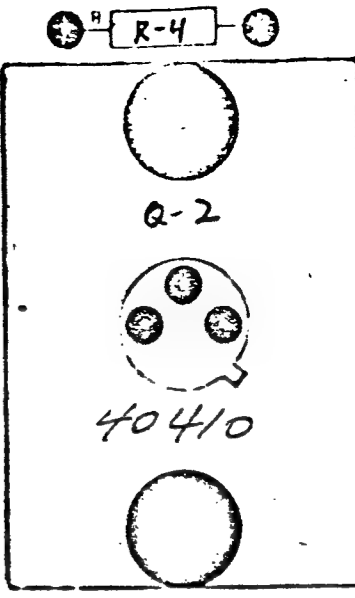
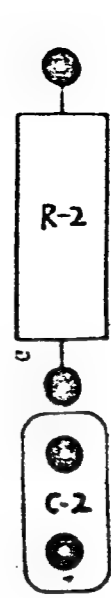
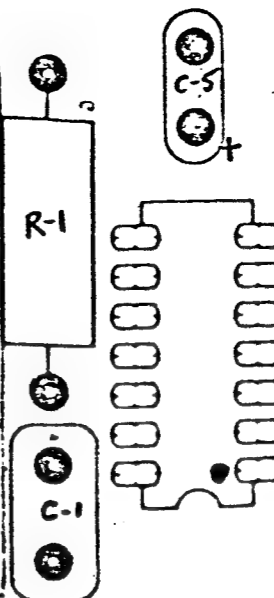
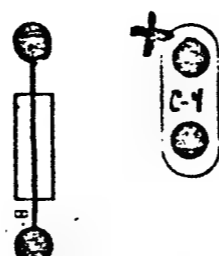
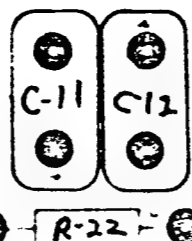
HCS  
68



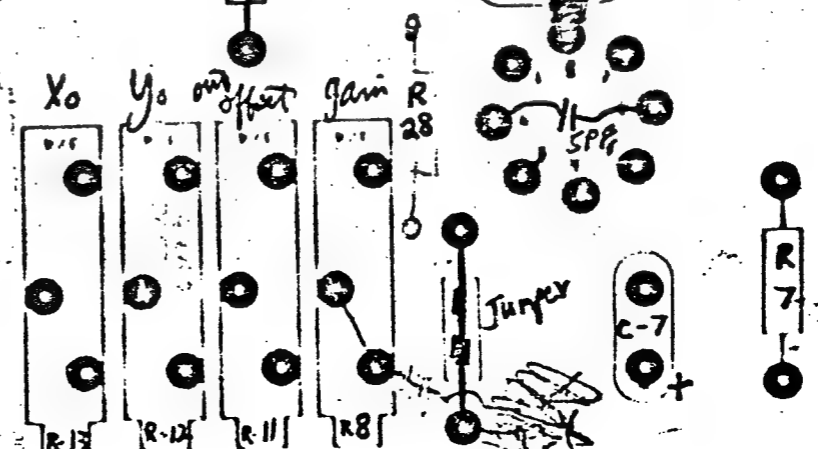
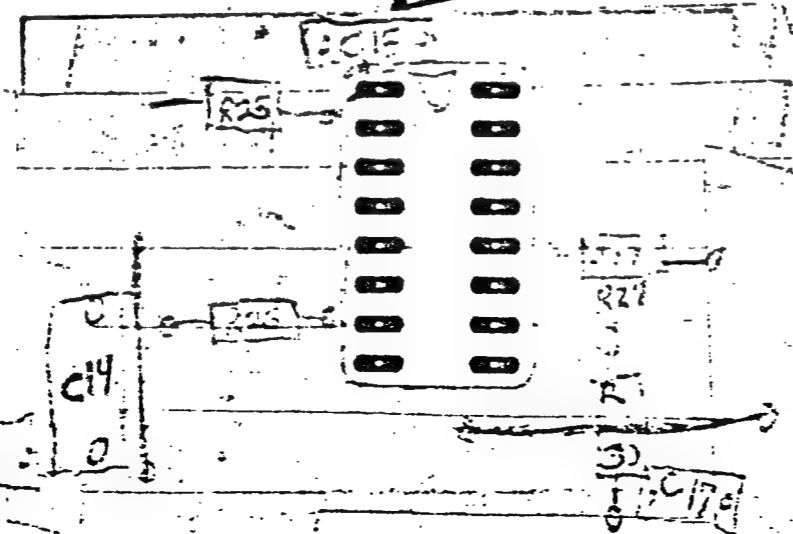
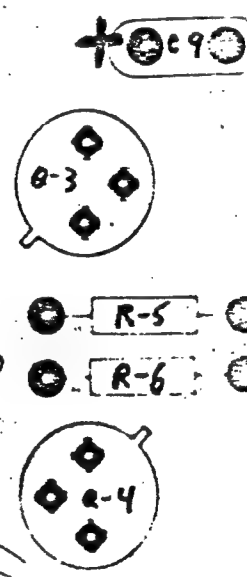
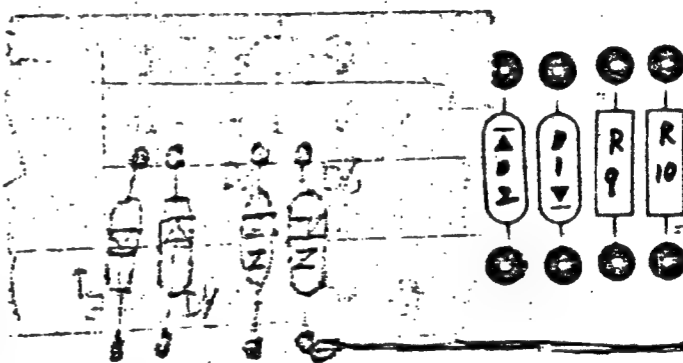
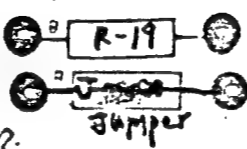
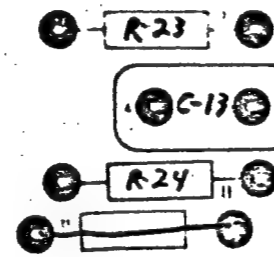
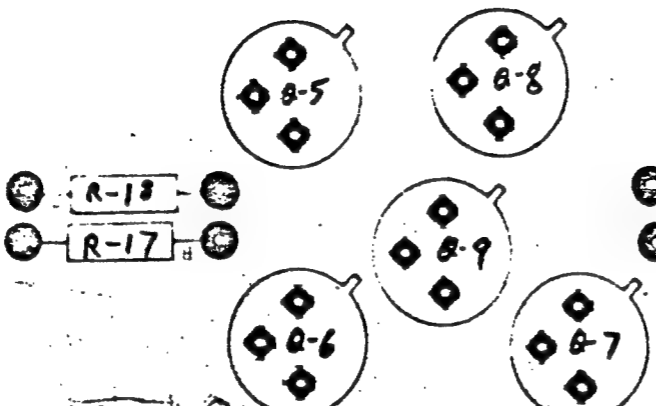


# PC-11B

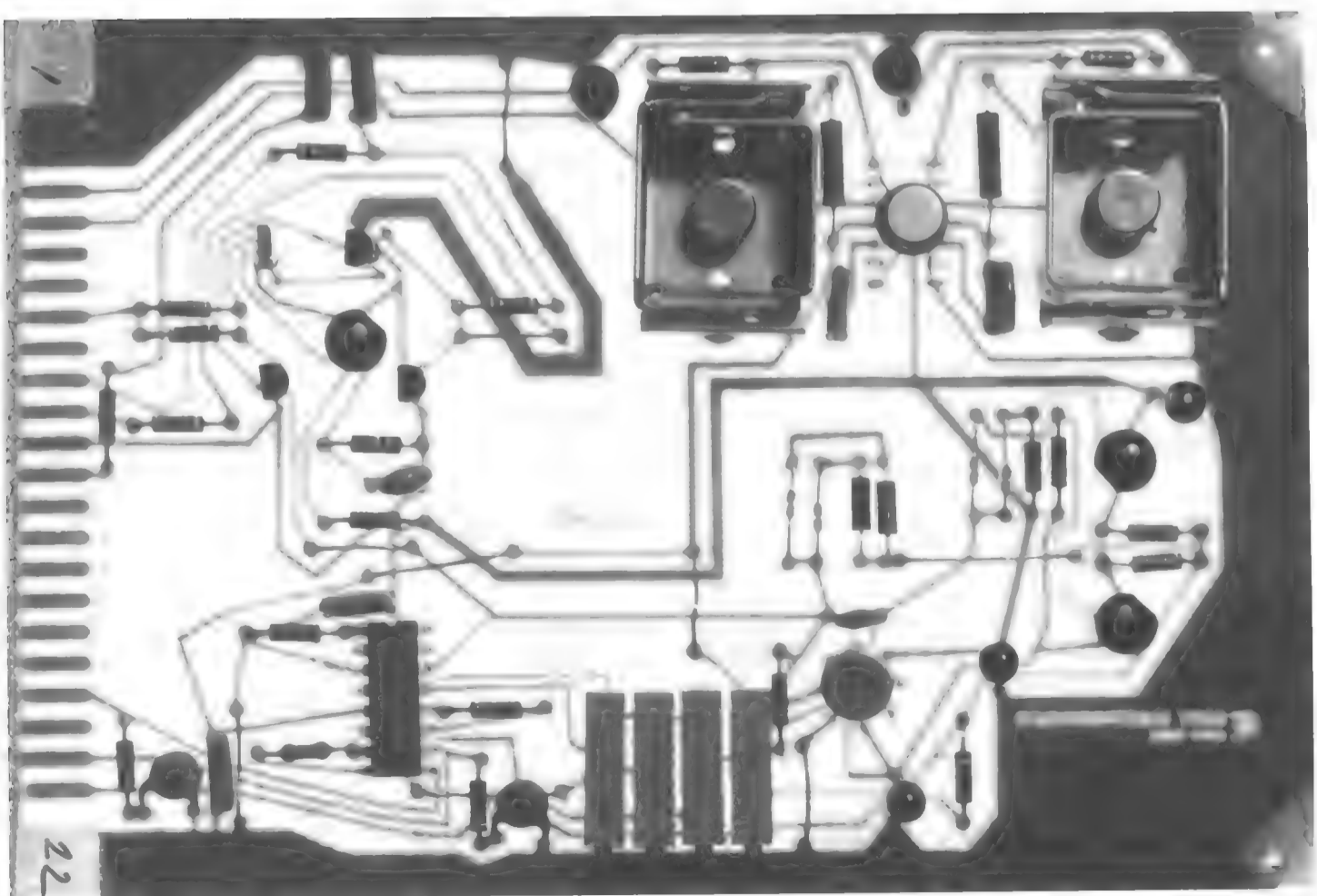
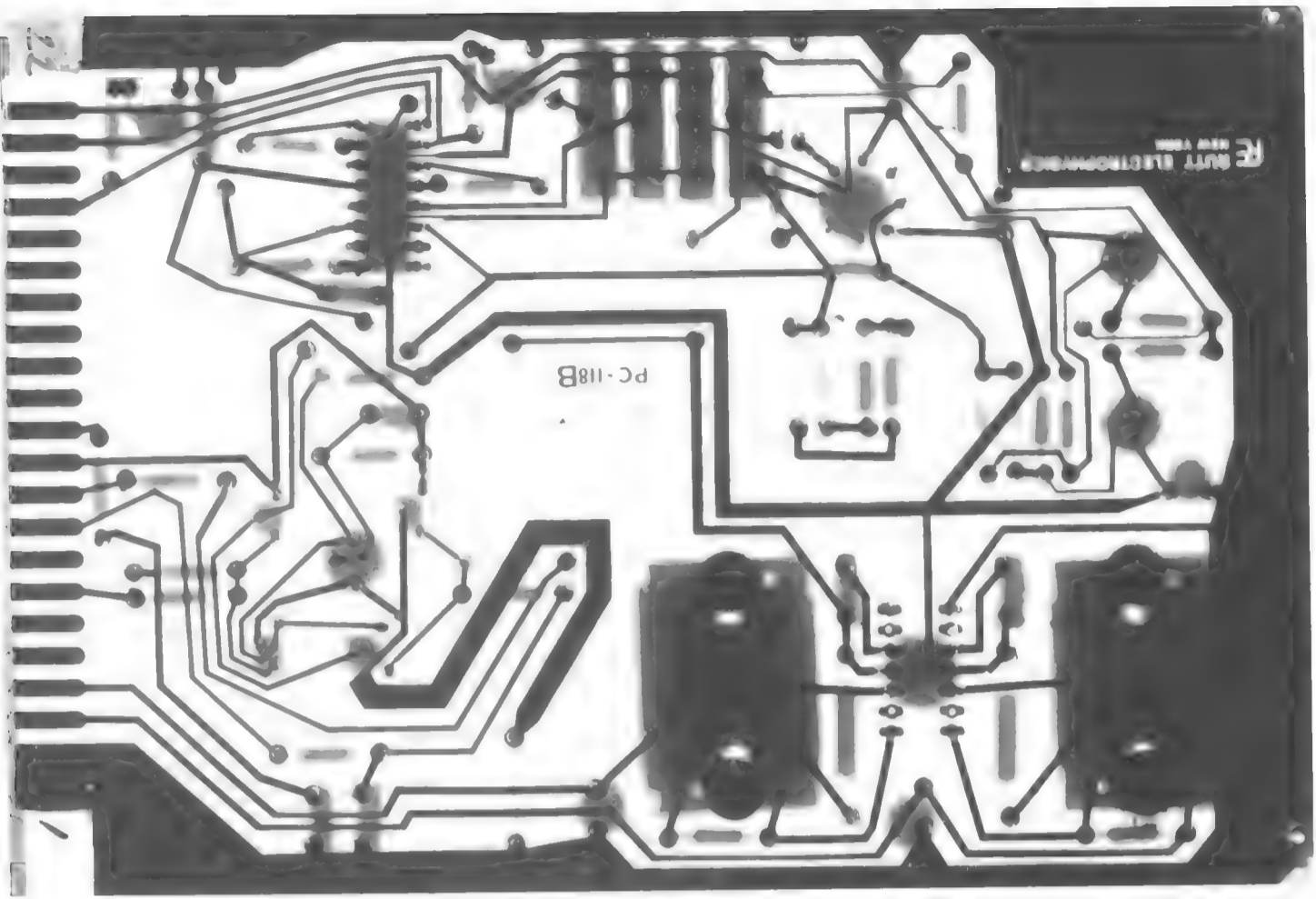
FET TOP VIEW



- GND 1
- GND 2
- +20V 3
- 20V 4
- 5
- 6
- L-1 POS 7
- 8
- B-2 POS 9
- L-2 POS 10
- QUAD TRK 11
- POS B-1 12
- 13
- 14
- 15
- 16
- 17
- 18
- SWEET 34 19
- 20
- CONTROL 21
- DISPLAY OUT 22



HCS 41



# VIDEO DRIVER ±15V POWER SUPPLY

Q-9 40409  
Q-10 40410  
IC-11 SG4501

C-30 .01 CER  
C-31 .01 CER

C-32 6.8K 35V TANT

C-33 6.8K 35V TANT

R-62 DATE

R-63 DATE

R-64 75Ω

R-65 75Ω

C-34 6.8K 35V TANT  
C-35 1M OVER 300V CER.

C-29 .1μF 50V

R-66 20K TRIM  
(GRID #1)

R-67 4.7K

C-36 .01μF 1KV DISC

C-37 " "

C-38 " "

C-39 " "

## CONNECTIONS

CRT	0	0	0	0	0
	FILE (HRT)	FILE (GRD)	GRID 1	GRID 2	CATHODE

VIDEO IN

0 GND

0 VIDEO IN

DCU	0	0	0	0	0	0	0
	GND	BLANK					

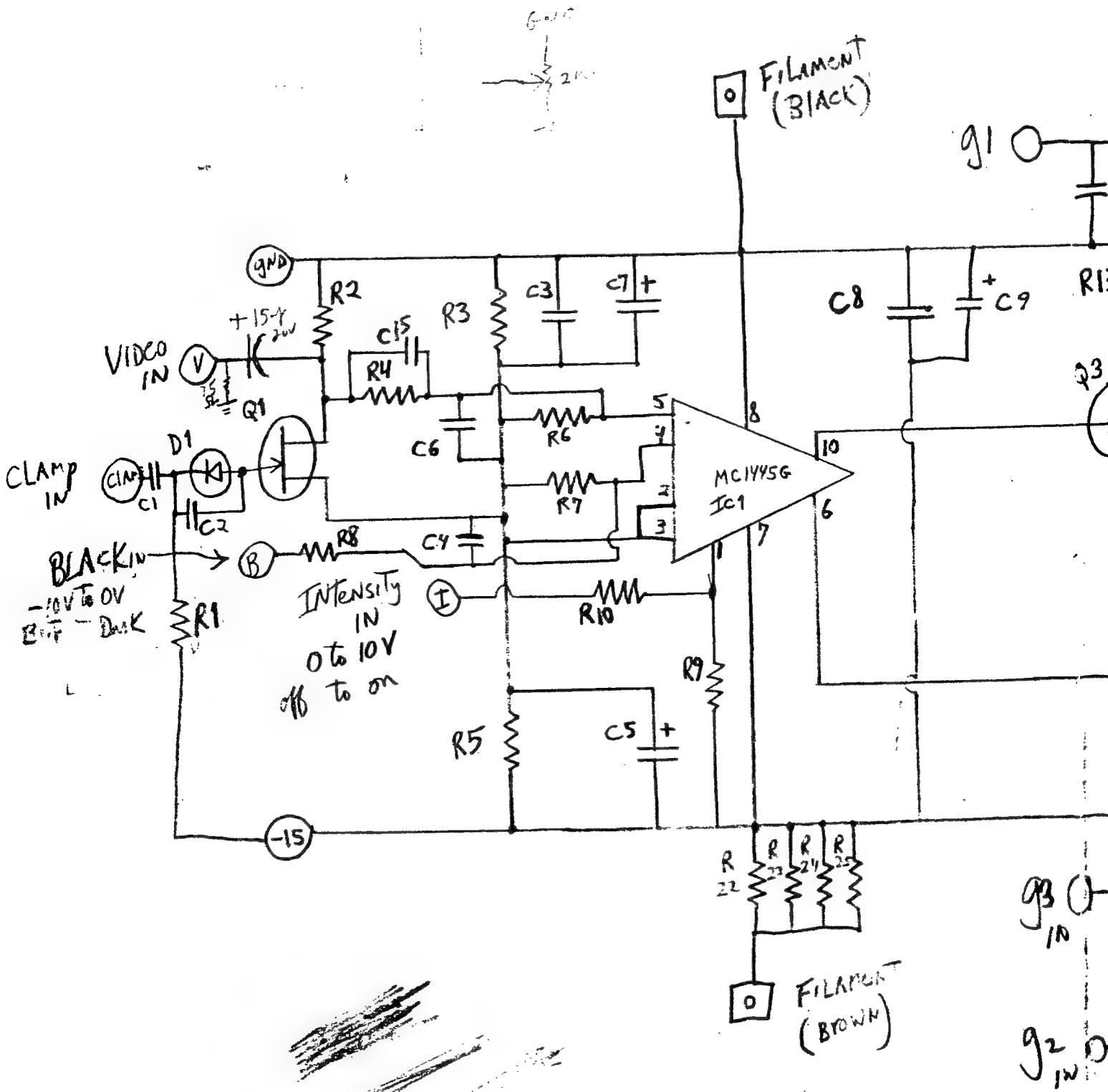
EDGE

BLANK

POWER SUPPLY	0	0	0	0	0	0
	+28	-28	0	0	0	+300
	+45			6.3V		

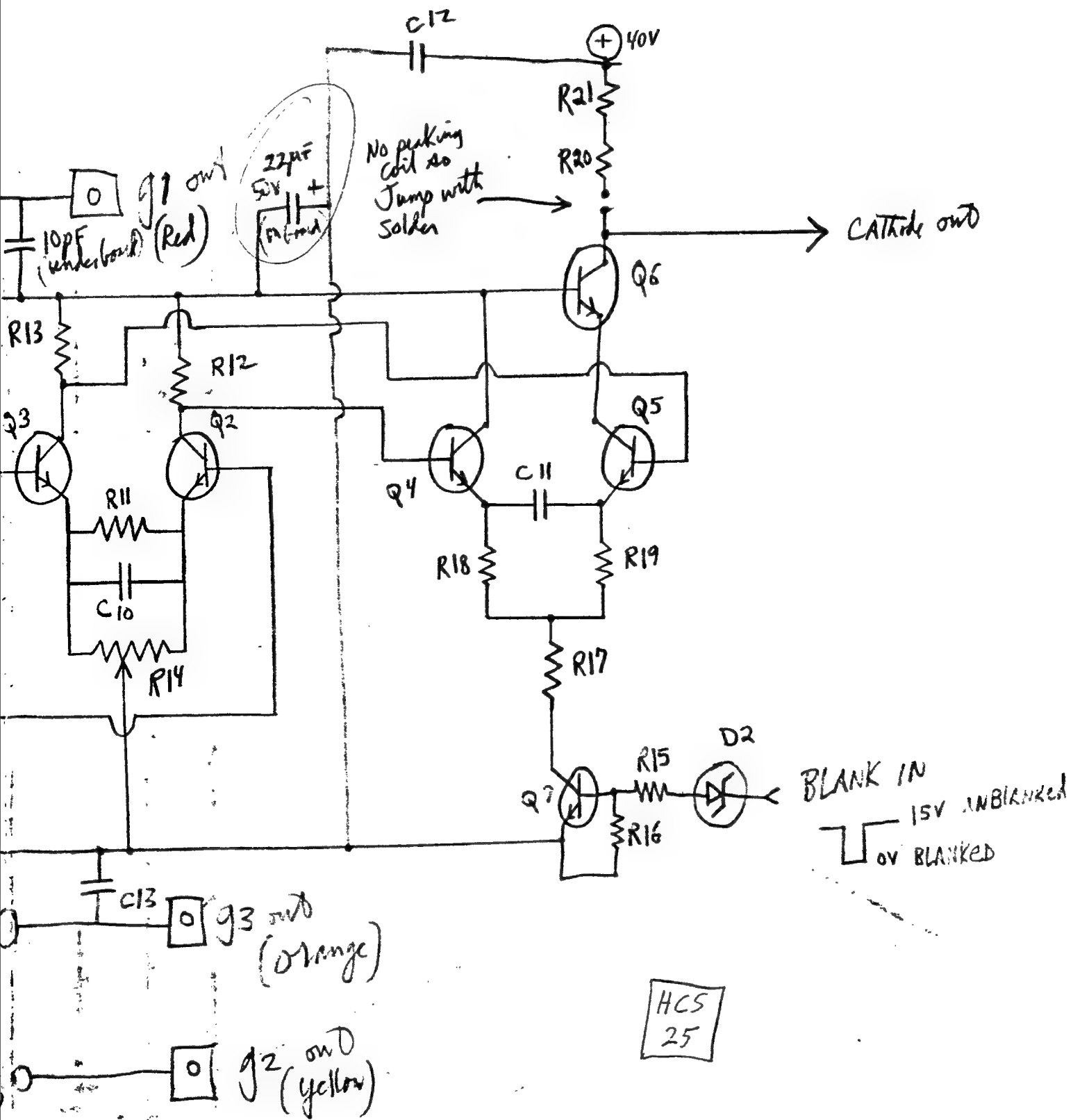
OVER BRIGHTNESS BLANKING

VIDEO



# CRT DRIVER

PC 119



## PC 119 Parts List - Video CRT Driver

### Transistors

Q1 - 2N4091  
Q2 - 2N5770, or MPS 6543, Hep56  
Q3 - or Hep 720  
Q4 - strap pairs together  
Q5 - for thermal contact  
Q6 - 2N2219A  
Q7 - MPS 5172

### Integrated Circuits

IC1 - MC 1445 G (or MC1545G is OK but  
expensive...) Use Heat SINK

# Parts List

PC 119

Video CRT Driver \*

- D<sub>1</sub> 1N914  
D<sub>2</sub> 1N5248 (18V Zener)  
→ Q<sub>1</sub> 2N4091  
Q<sub>2</sub> 2N5770  
→ Q<sub>3</sub> MPS 6543, Hep 56, Transistors  
Q<sub>4</sub> Strap these Hep 720 together  
Q<sub>5</sub> 2N2219A  
→ Q<sub>6</sub> MPS 5172 Transistor  
→ Q<sub>7</sub> MPS 5172 Transistor  
- R<sub>1</sub> 47K — all 1/4 watt  
- R<sub>2</sub> 75Ω 5%  
- R<sub>3</sub> 270Ω  
- R<sub>4</sub> ~~27K~~ 27K  
- R<sub>5</sub> 180Ω  
- R<sub>6</sub> 1K  
- R<sub>7</sub> 1K  
- R<sub>8</sub> 470K — use 2-1 Meg in parallel if you don't have 470K  
- R<sub>9</sub> 3-3K (3.6K is not as good)  
- R<sub>10</sub> 4.7K (use 6.8K if R<sub>9</sub>=3.6K)  
- R<sub>11</sub> ~~51Ω~~  
- R<sub>12</sub> 470Ω  
- R<sub>13</sub> 470Ω  
R<sub>14</sub> 2K pot  
- R<sub>15</sub> 1K  
- R<sub>16</sub> 1K  
→ R<sub>17</sub> ~~180Ω~~ 180Ω  
- R<sub>18</sub> 51Ω  
- R<sub>19</sub> 51Ω  
- R<sub>20</sub> 510Ω  
- R<sub>21</sub> 510Ω  
- R<sub>22</sub> } Use 3-120Ω (R<sub>22</sub>, 23, 24)  
23 } or 4-150Ω (R<sub>22</sub>, 23, 24, 25)  
24 } (to equal 40Ω)  
25 }

IC1  
Heatsink  
IC1

MC1445G

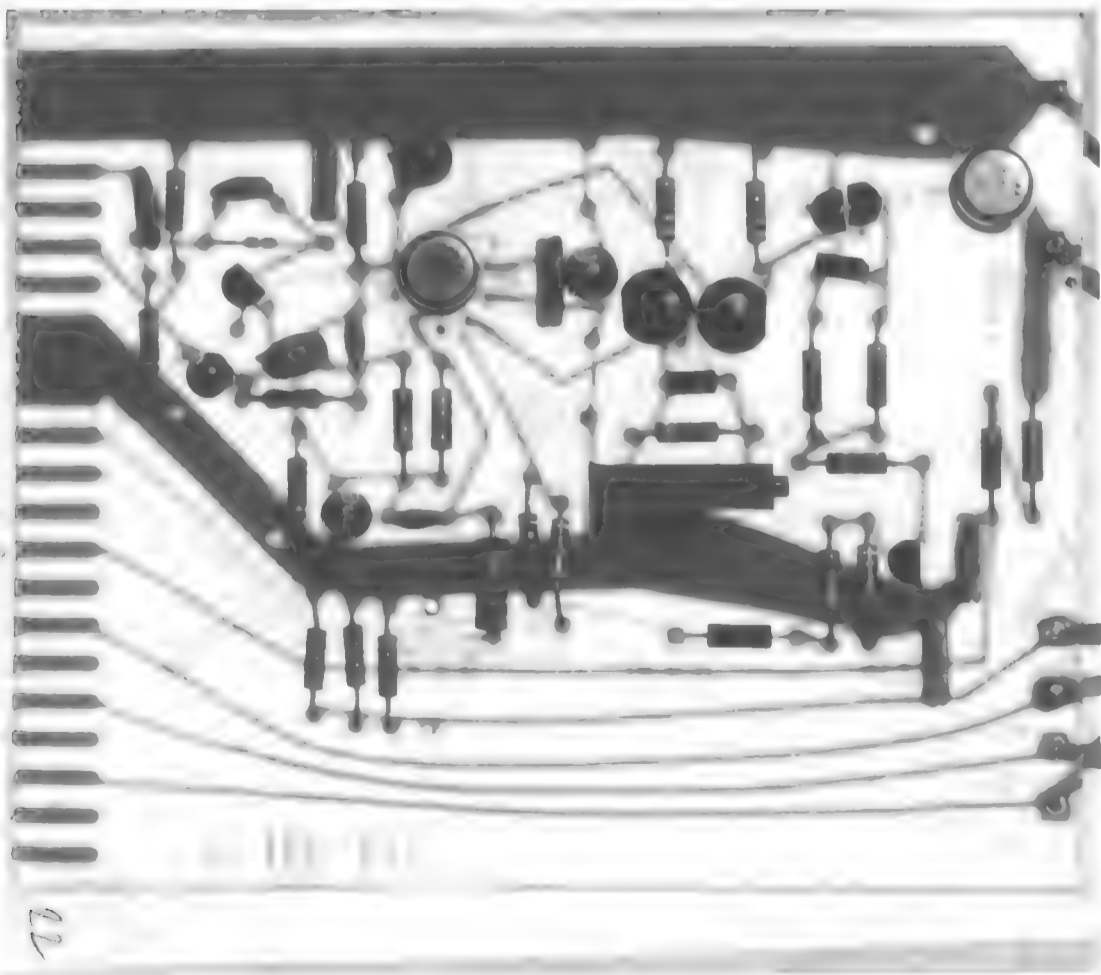
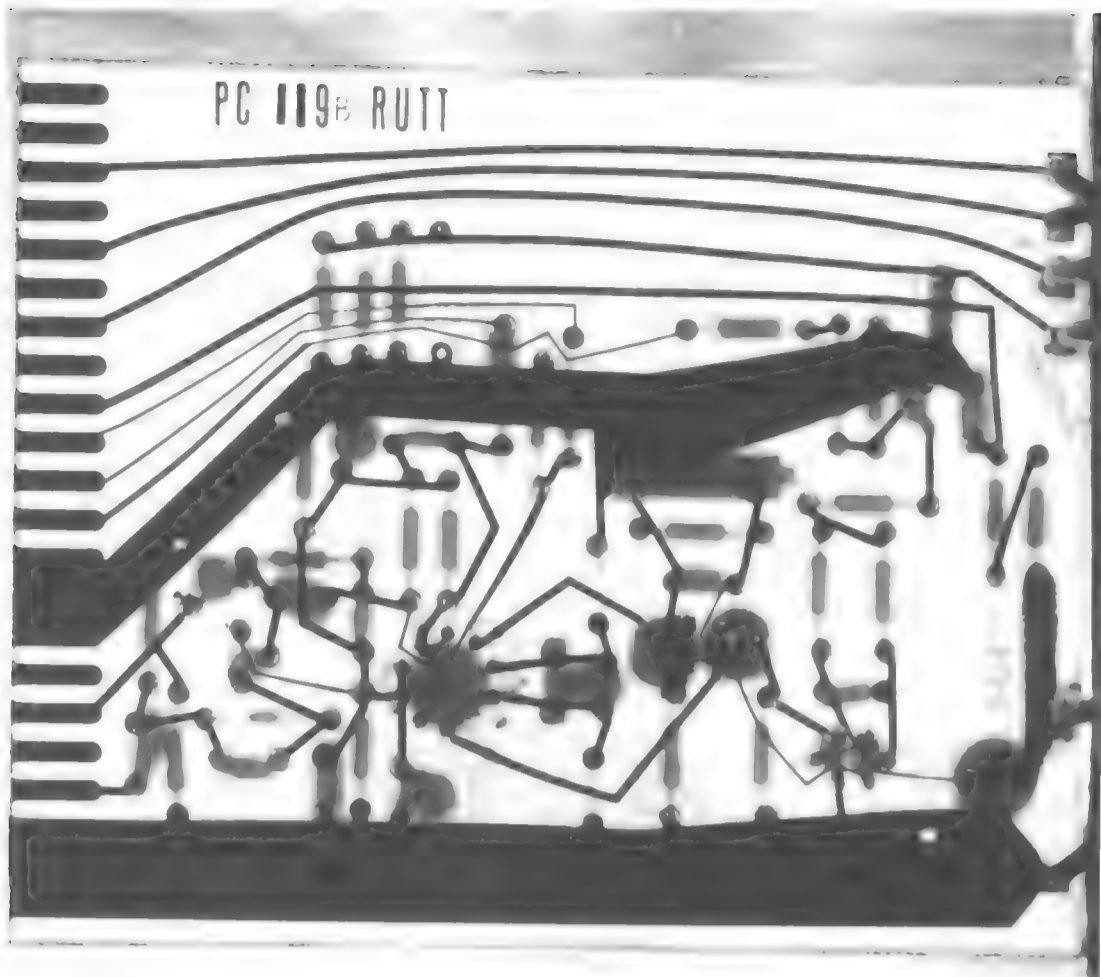
(1545G is OK also but expensive)

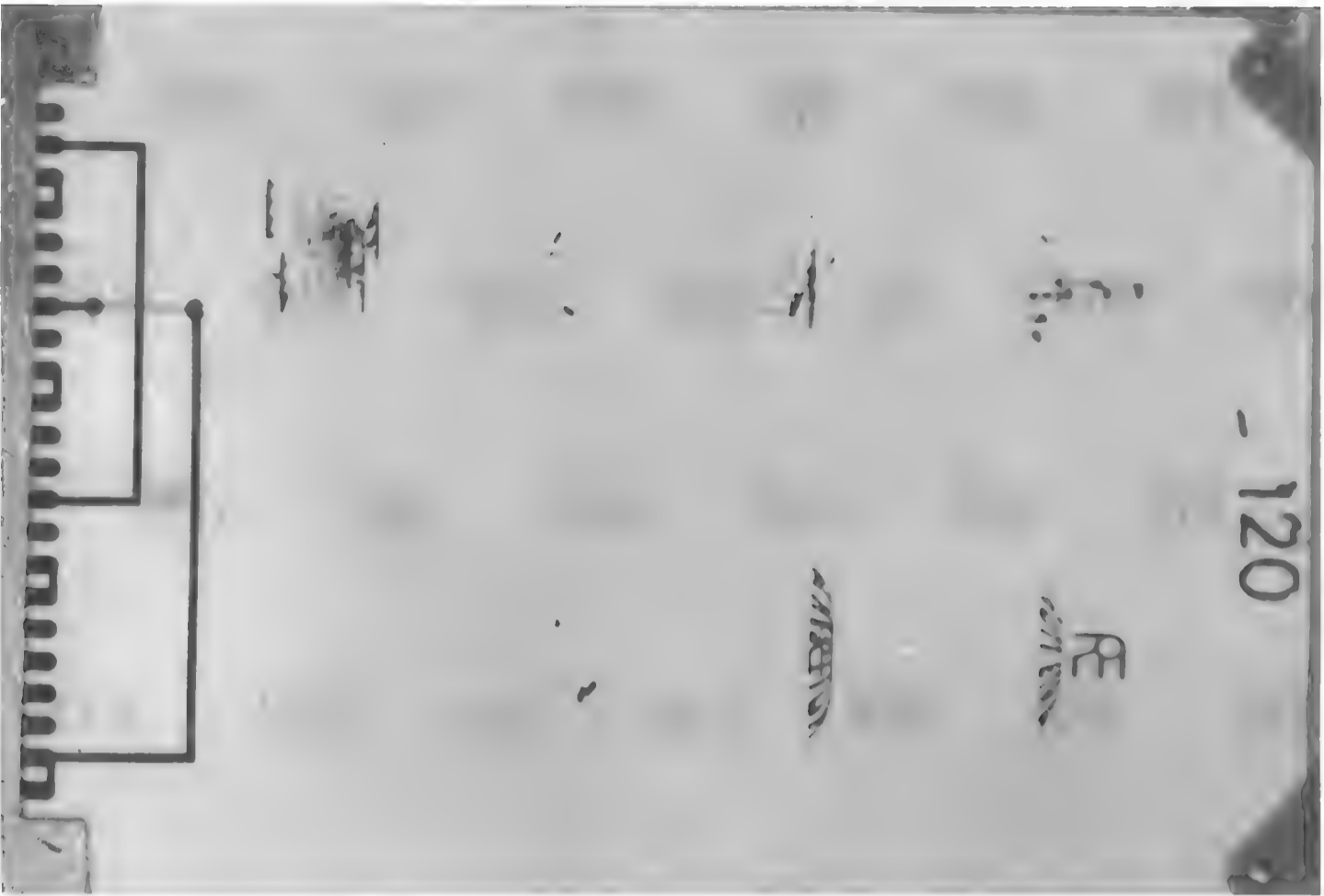
- C<sub>1</sub> .001  
- C<sub>2</sub> 10 pF  
- C<sub>3</sub> .1 ceramic  
- C<sub>4</sub> 33 pF  
- C<sub>5</sub> 15 μF/20V  
- C<sub>6</sub> 33 pF  
- C<sub>7</sub> 15 μF/20V  
- C<sub>8</sub> .1 ceramic  
- C<sub>9</sub> 15 μF/20V  
- C<sub>10</sub> ~~100 pF~~ 100 pF \*  
- C<sub>11</sub> ~ ~~100 pF~~ 100 pF \*  
- C<sub>12</sub> .1 μF ceramic  
- C<sub>13</sub> .1 μF ceramic  
- C<sub>14</sub> 15 μF/20V  
- C<sub>15</sub> gimmick \* 1 pF



\* These parts are fine for  
NON-30 MHz use  
for broadcast use, C<sub>10</sub>, C<sub>11</sub>  
and C<sub>15</sub> are  
critical and need adjustment  
for each board

HCS  
37





PC-121

Q-1 FET 3462  
 Q-2 FET "  
 Q-3 FET "  
 Q-4 FET "  
 Q-5 NPN  
 Q-6 NPN - 2N3858  
 Q-7 PNP - 110T 4040  
 Q-8 40409  
 Q-9 40410

UNDER  
BOARD

4	C-1	.1 $\mu$ -	R-1	8.2K -
4	C-2	.1 $\mu$ -	R-2	8.2K -
4	C-3	.1 $\mu$ -	R-3	8.2K -
4	C-4	.1 $\mu$ -	R-4	8.2K -
4	C-5	5PF -	R-5	1K -
3	C-6	154 20V -	R-6	1K -
4	C-7	100PF -	R-7	1K -
4	C-8	.1 $\mu$ -	R-8	1K -
4	C-9	.1 $\mu$ -	R-9	15K -
3	C-10	154 20V/	R-10	15K -
3	C-11	154 20V/	R-11	20K -
4	C-12	.1 $\mu$ -	R-12	4.7K -
4	C-13	.1 $\mu$ -	R-13	100K -
3	C-14	154 20V/	R-14	10K -
3	C-15	154 20V/	R-15	152 OHM -
3	C-16	104 25V/	R-16	152 OHM -
3	C-17	104 25V/	R-17	752 -
			R-18	752 -
			R-19	752 -
			R-20	752 -
			R-21	.5 Dale -
			R-22	.5 " -
			R-23	50K POT (GOK)

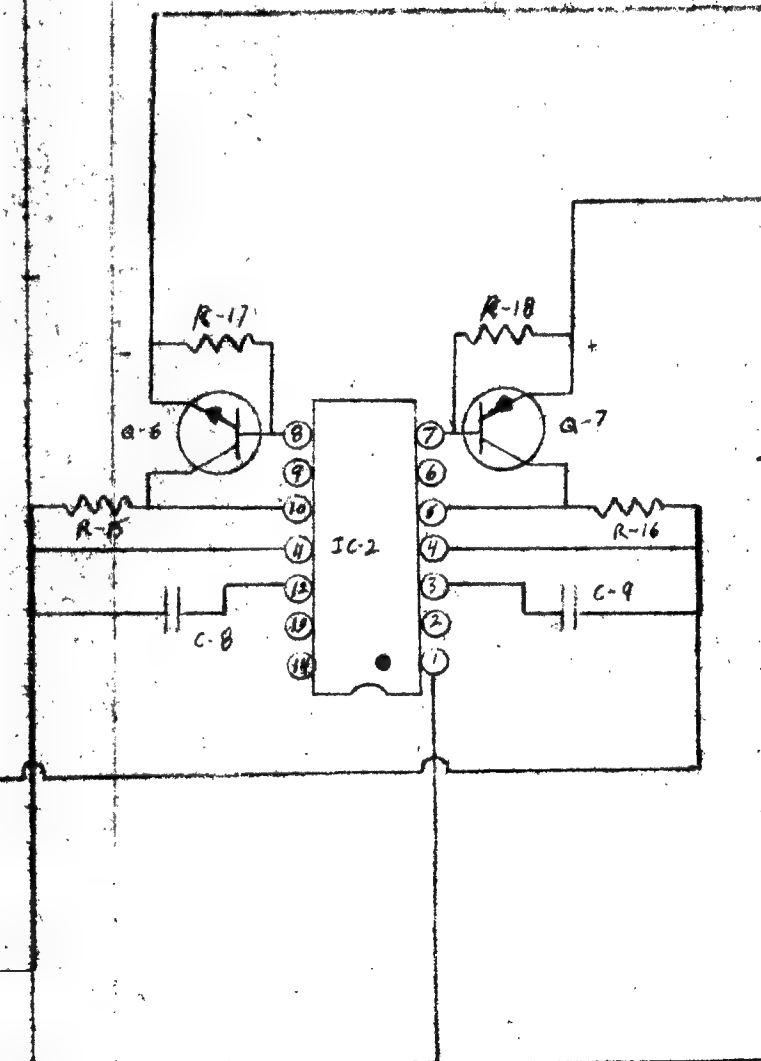
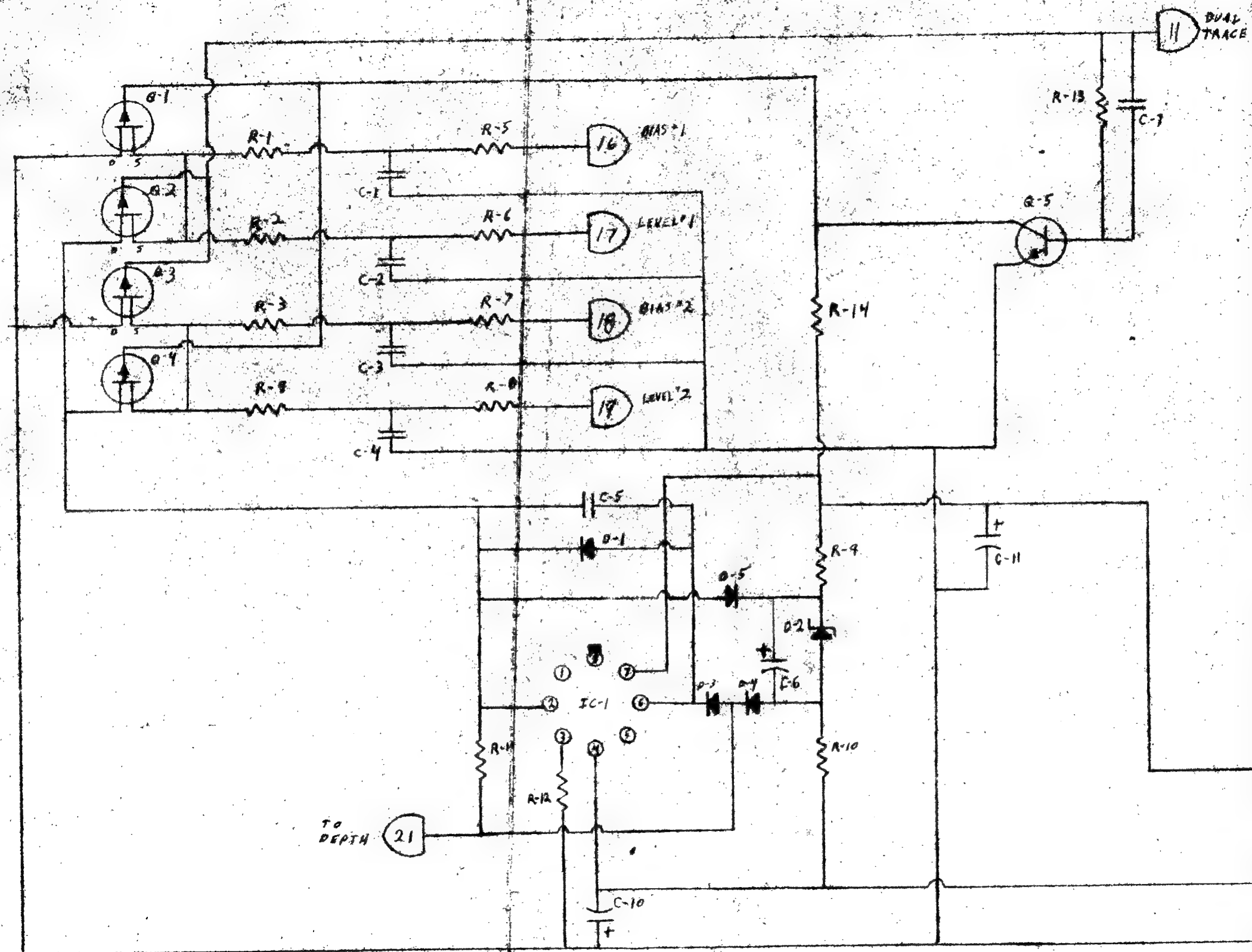
IC-1 LM318 -OP AMP  
 IC-2 SG 4501 REGULATOR  
 IC-3 SG 4501 LI

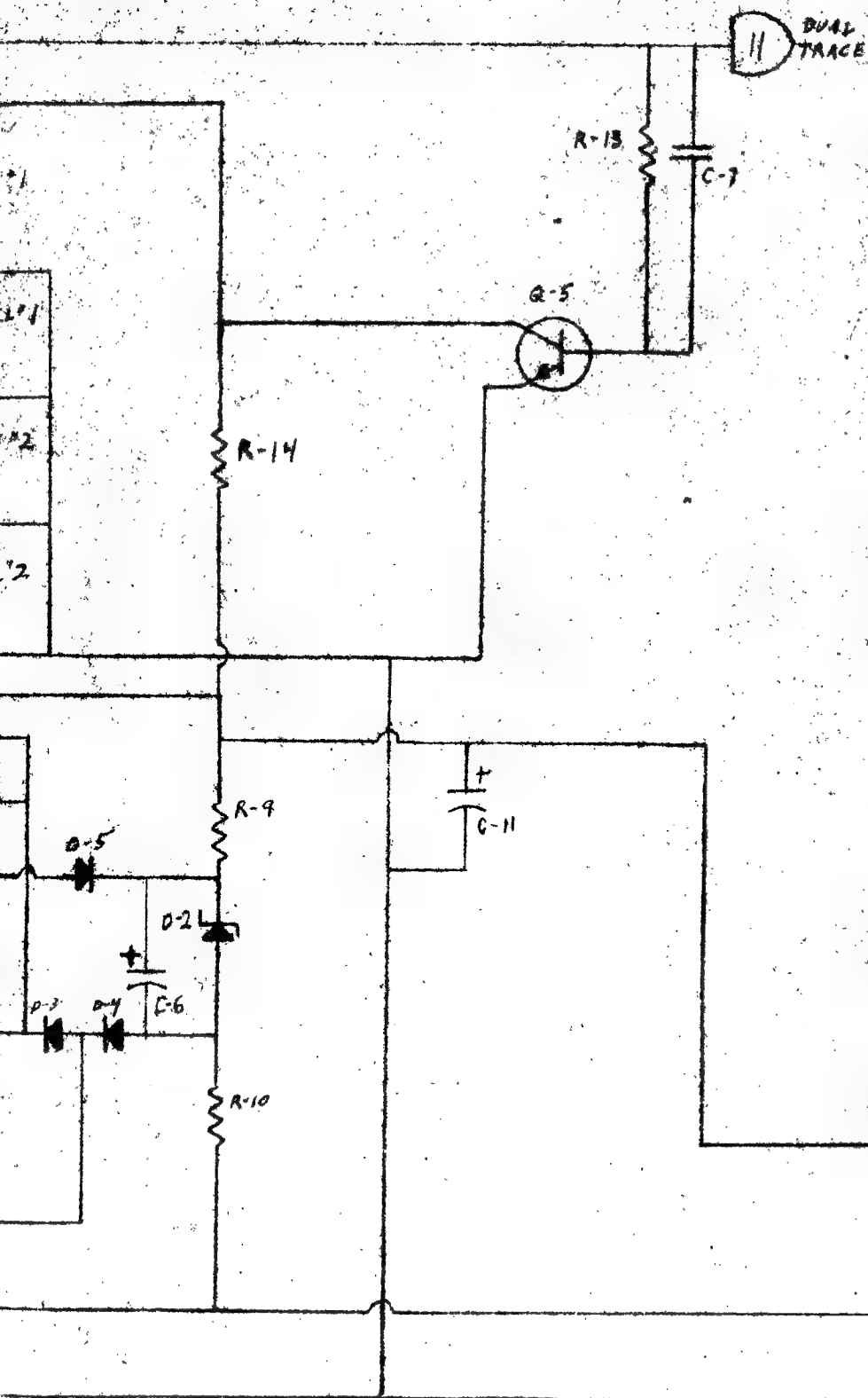
R23  $\pm$  10 VOLT ADJUST  
 PIN 6  $\rightarrow$  4.7K

CW  $\rightarrow$  INCREASE

D-1 1N914  
 D-2 9.1V ZENER  
 D-3 1N914  
 D-4 "  
 D-5 "

ACS  
 65

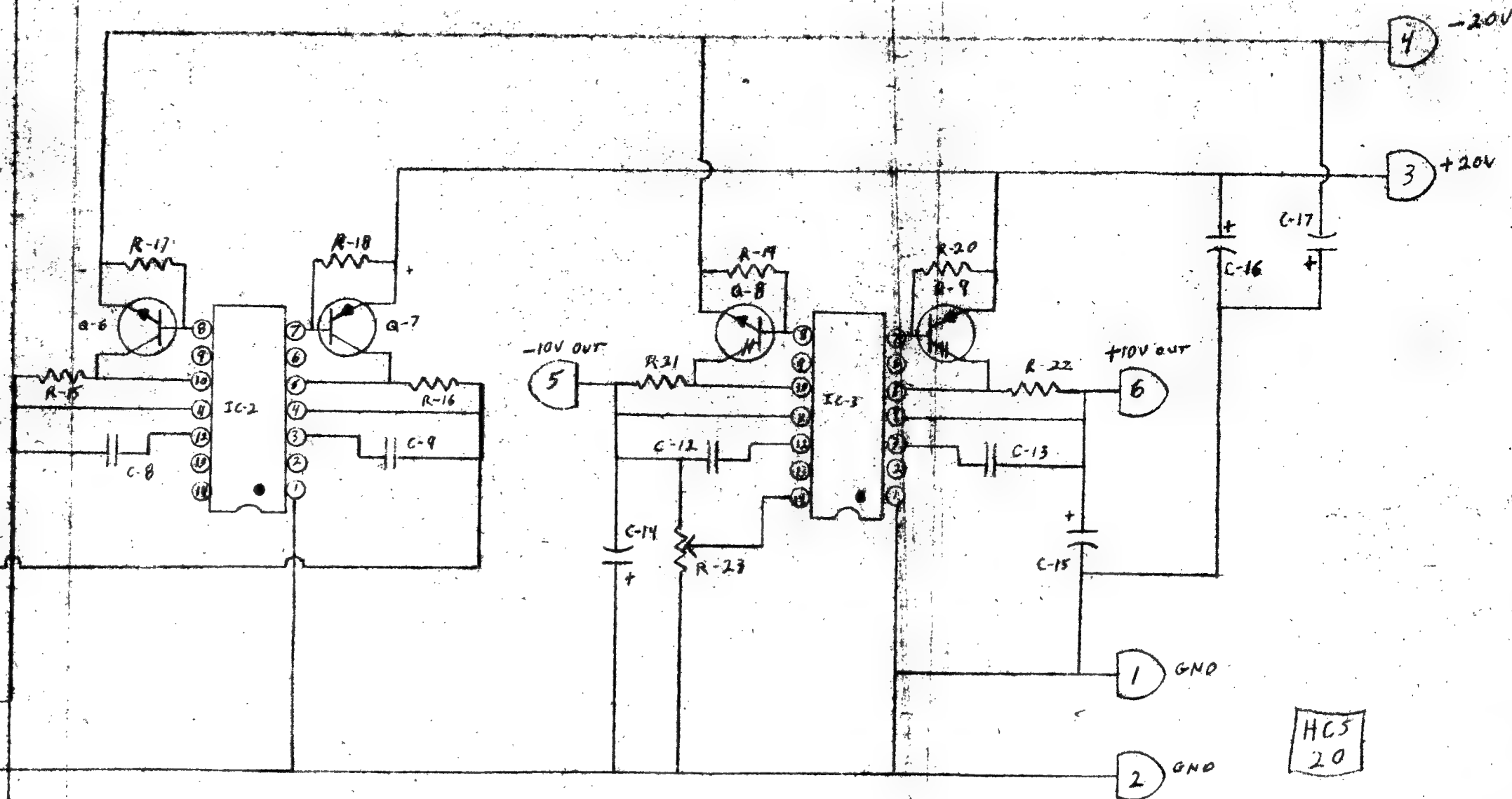




PC-121

RUTT ELECTROPHYSICS

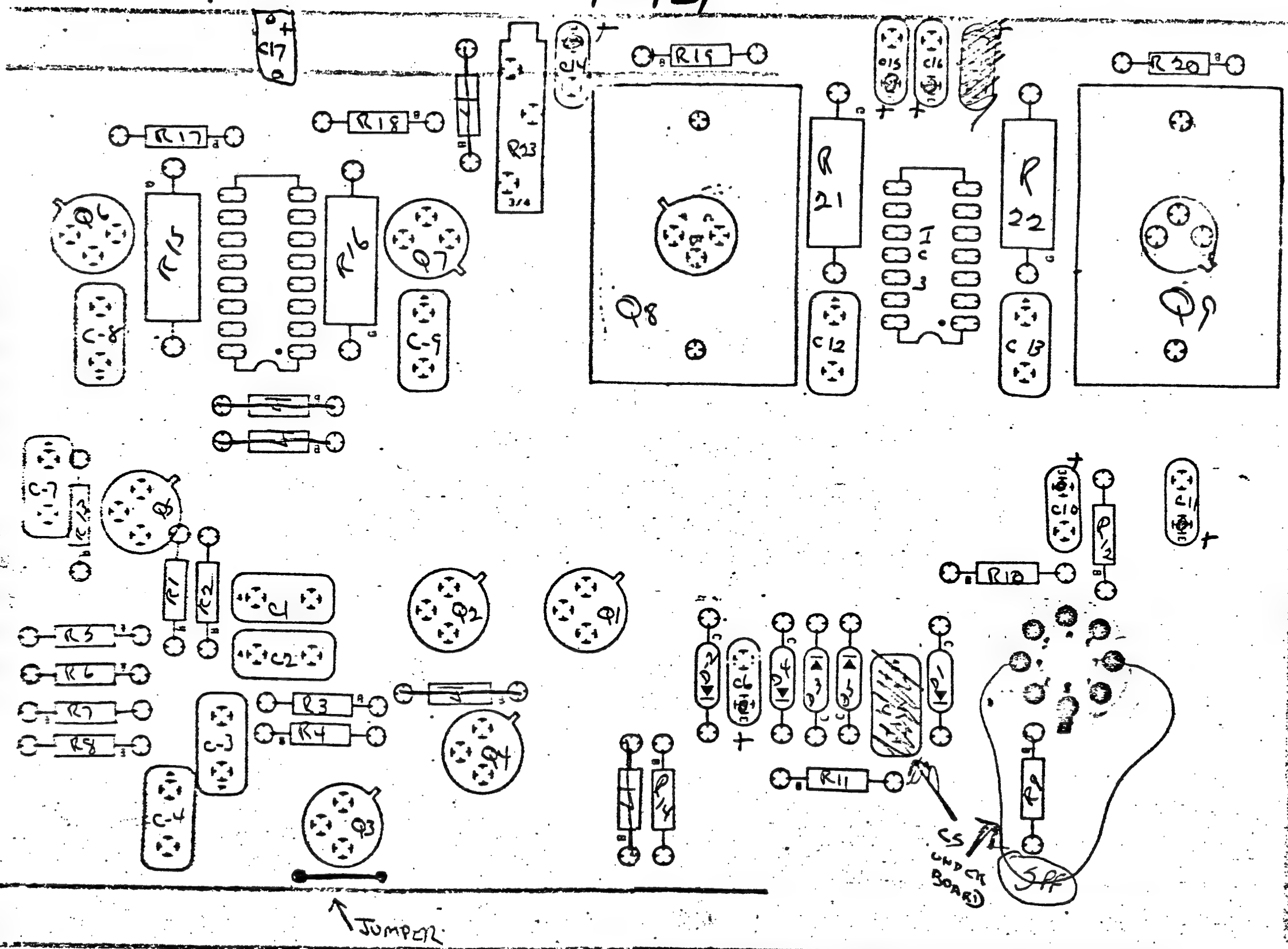
APRIL 1974



HCS  
20

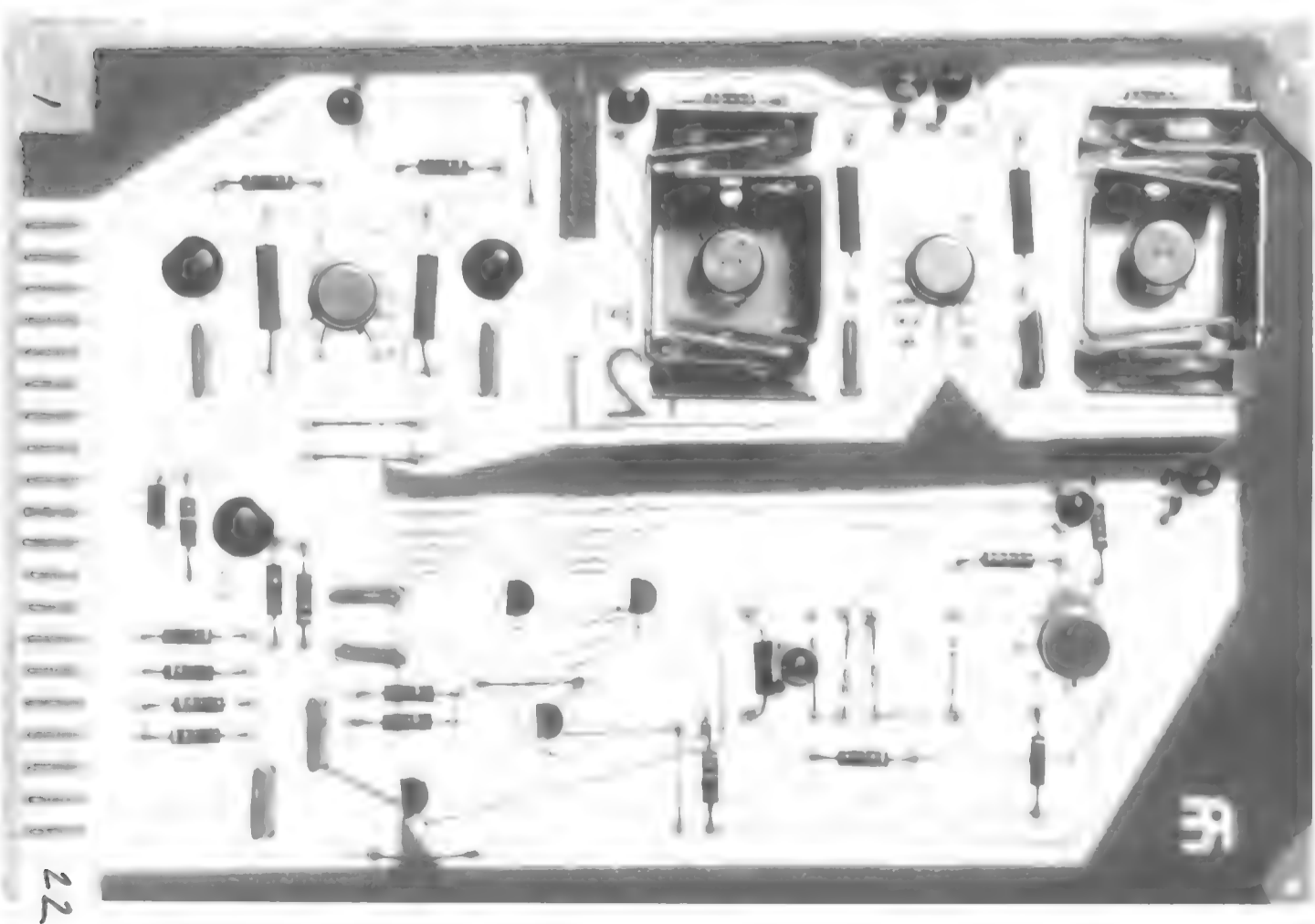
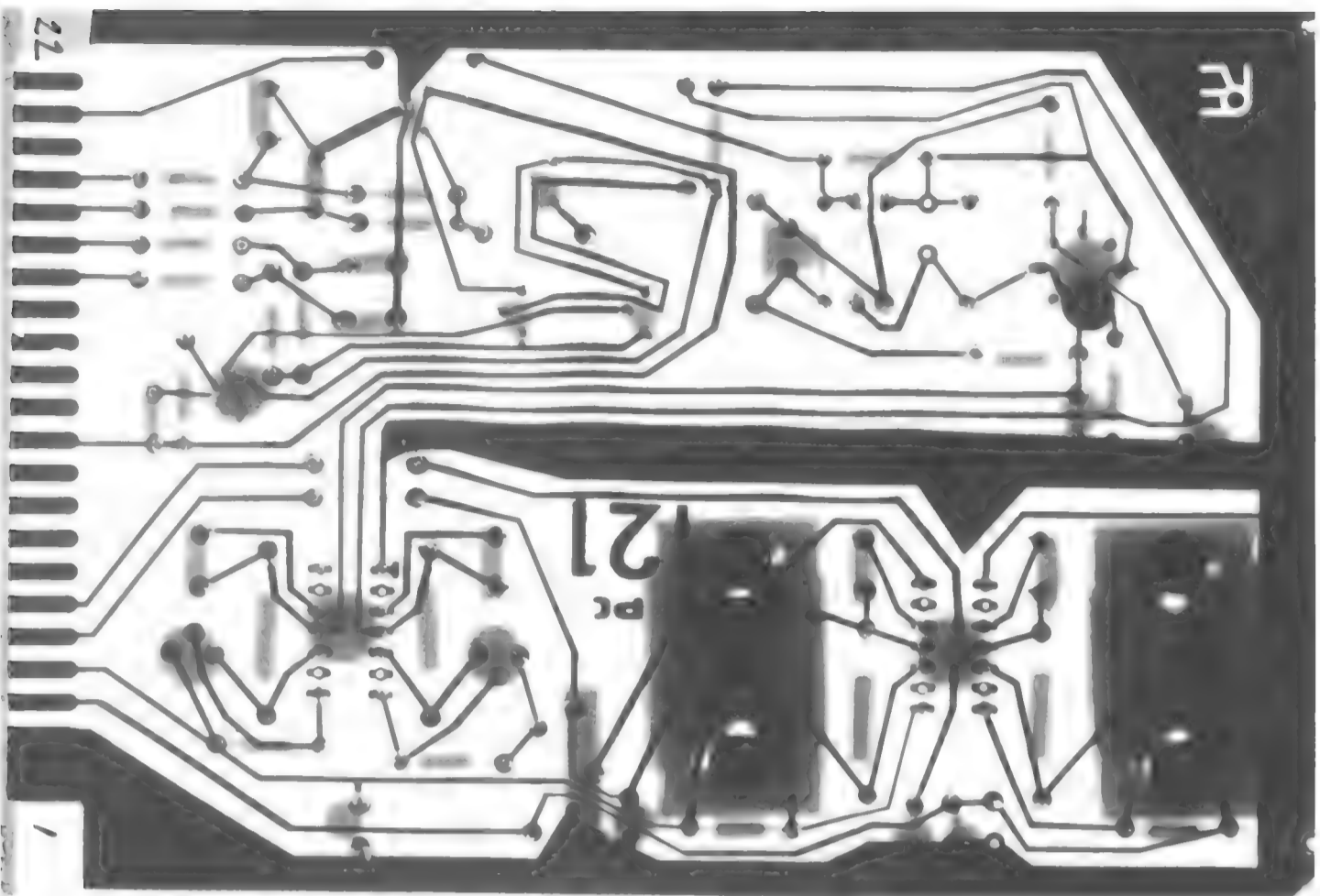
PC-121

- GRND 1
- GRND 2
- +20 3
- 20 4
- 10VTS
- +10VTS
- 7
- 8
- 9
- 10
- DATA TRACE
- 12
- 13
- 14
- 15
- BIAS 1 16
- LEV 1 17
- BIAS 2 18
- LEV 2 19
- 20
- TO 118-21
- TO 118-22



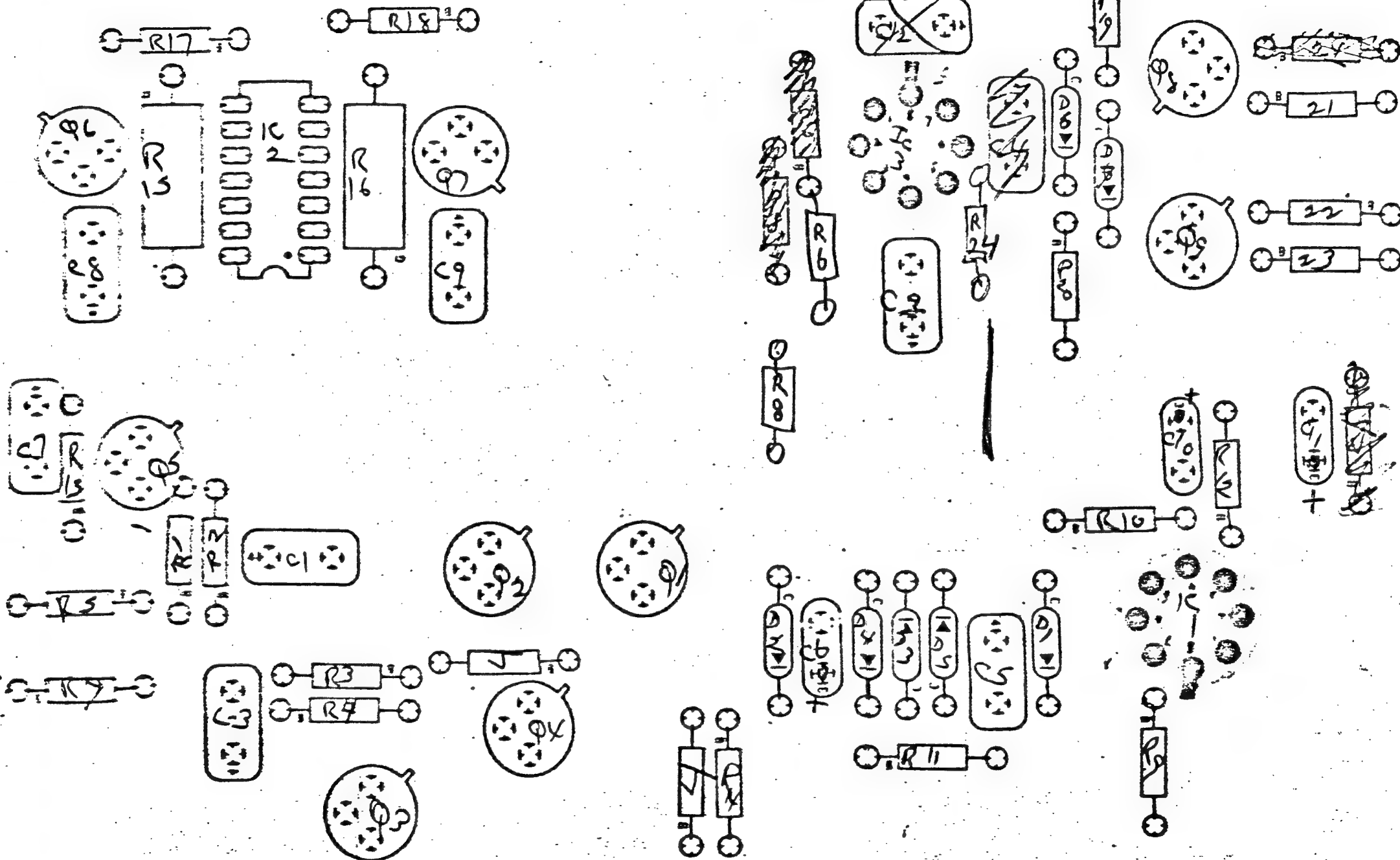
HCS  
54

OK 5.11  
5.2



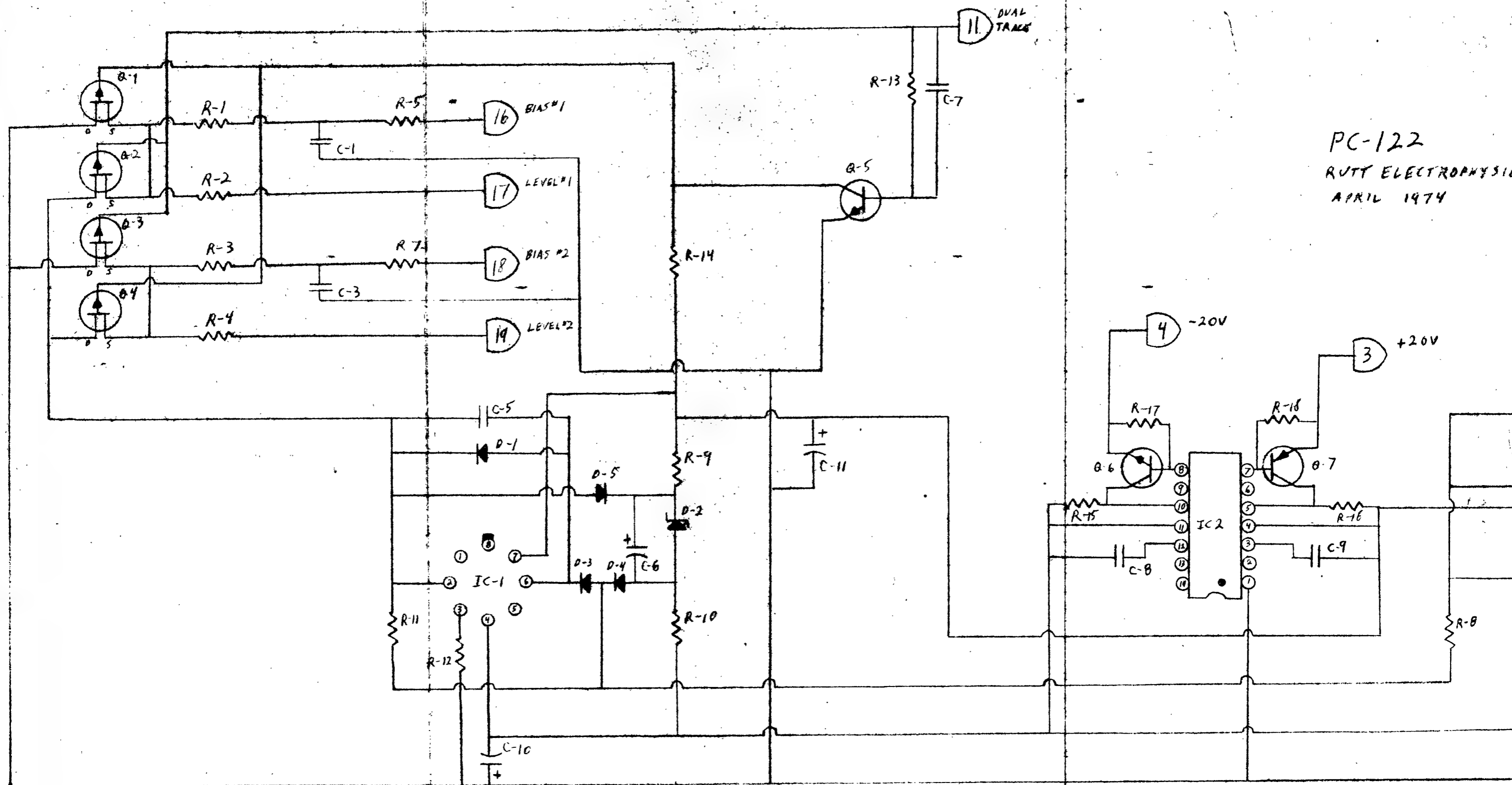
PC-122

84  
0

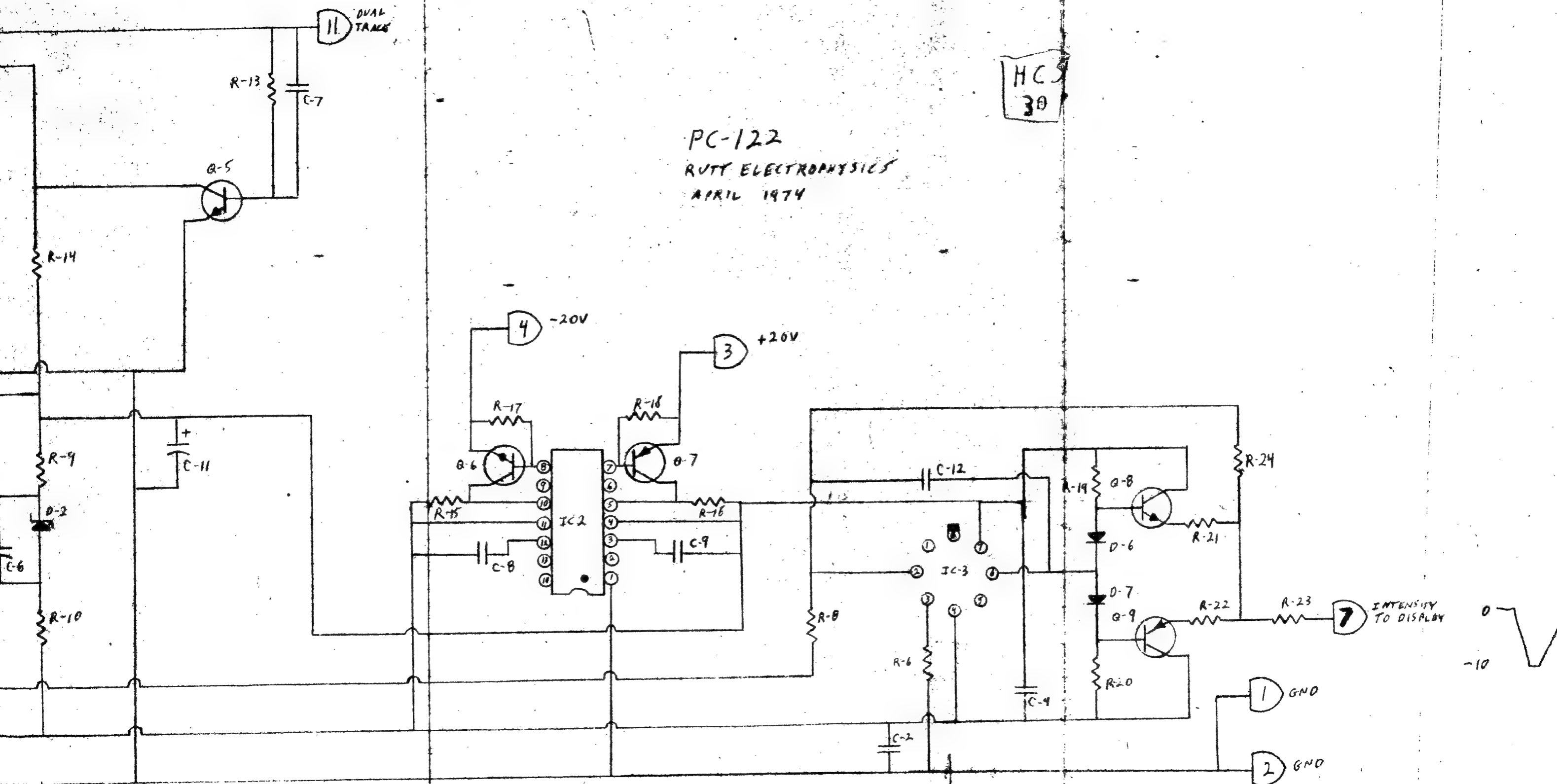


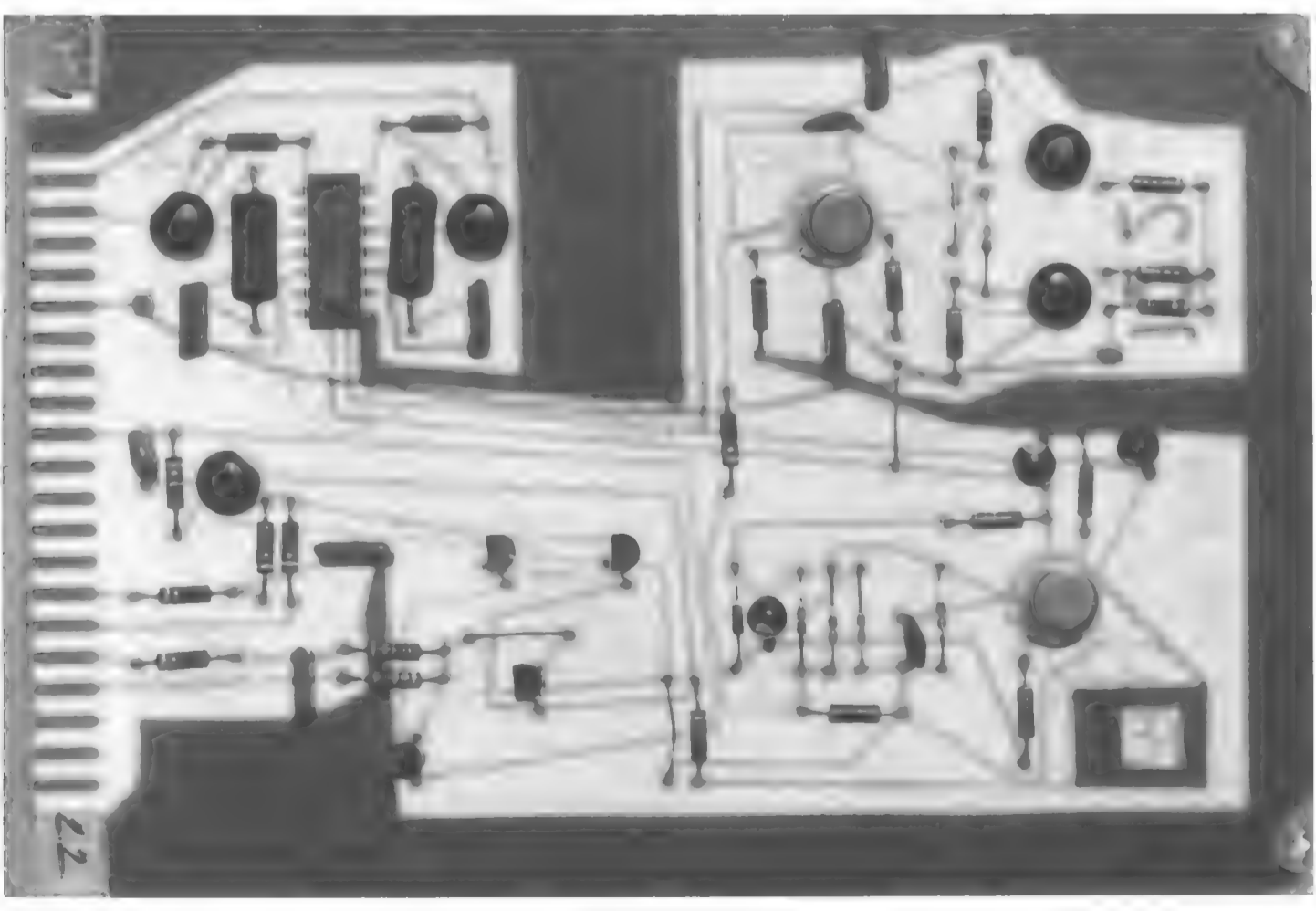
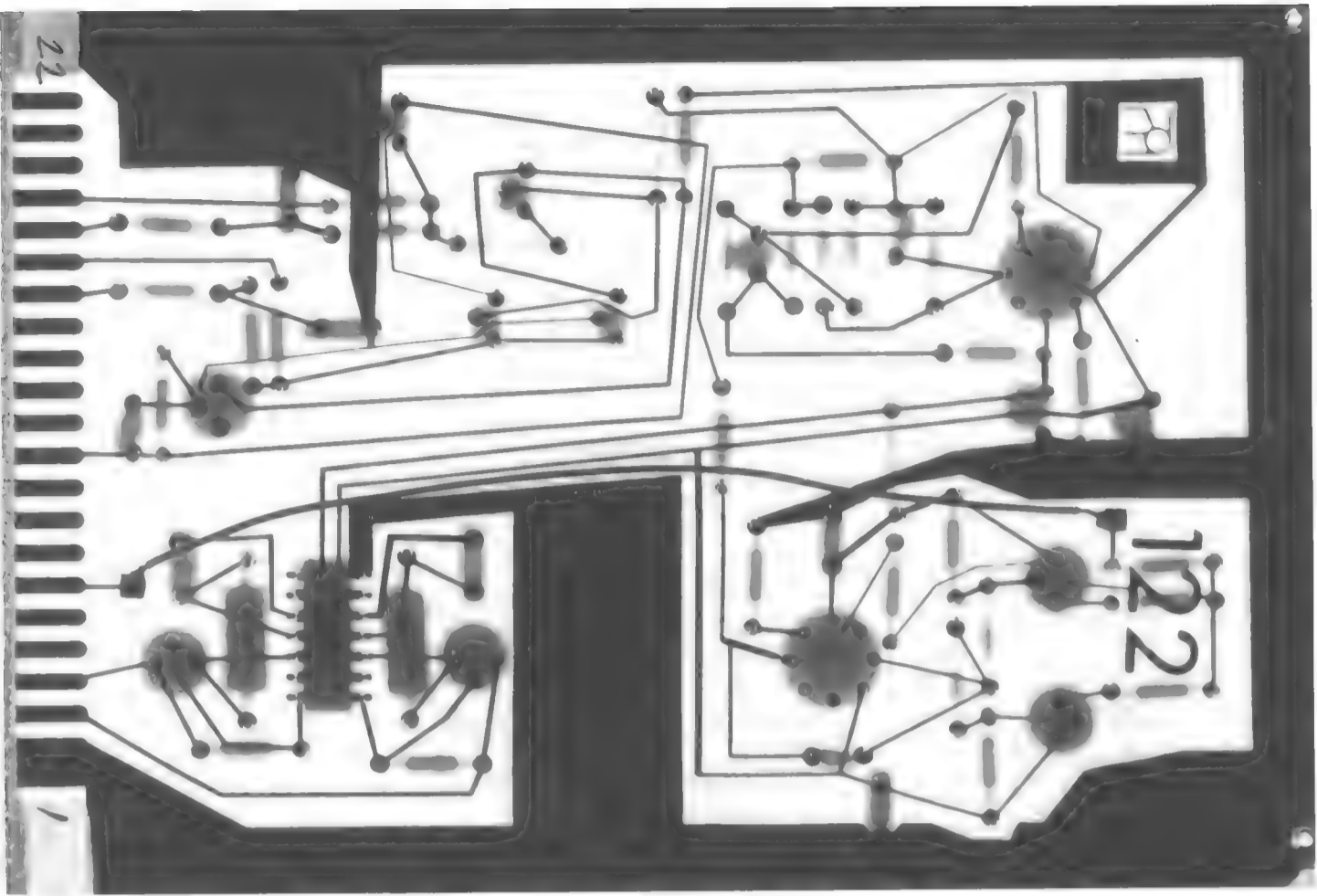
OK. June

HCS  
49



122

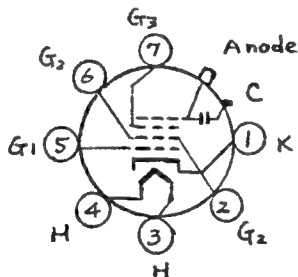




Minimum screen dimensions (projected)	
Diagonal .....	4.921" (127.3 mm)
Width .....	4.291" (109.9 mm)
Height .....	3.267" ( 84.9 mm)
Weight (Approx.) .....	0.5 kg
Operating Position .....	Any
Anode cap .....	Small Cavity (J1-21)
Base .....	Small-Button Special miniature 7 pin (E7-91)
Basing .....	

Bottom view

Pin 1-Cathode  
Pin 2-Grid-No.2  
Pin 3-Heater  
Pin 4-Heater  
Pin 5-Grid-No.1  
Pin 6-Grid-No.2  
Pin 7-Grid-No.3



. Cap-Anode (Grid No.4  
screen collector)

C-External conductive  
coating

#### GRID-DRIVE SERVICE

Unless otherwise specified, voltage values are positive with respect to cathode.

#### MAXIMUM AND MINIMUM RATINGS (Design-Maximum Values)

Anode Voltage .....	{ 10000 max volts 7000 min volts
Grid-No.3 (Focusing) Voltage:	
Positive value .....	1100 max volts
Negative value .....	550 max volts
Grid-No.2 Voltage .....	{ 550 max volts 250 min volts
Grid-No.1 Voltage:	
Negative-bias value .....	125 max volts
Positive-bias value .....	0 max volts
Positive-peak value .....	2 max volts
Heater voltage .....	{ 13.9 max volts 11.3 min volts
Peak Heater-Cathode Voltage 1)	
Combined AC & DC Voltage .....	130 max volts
DC Component .....	80 max volts

## EQUIPMENT DESIGN RANGES

Grid-No.3 Current .....	-25 to +25 $\mu$ A
Grid-No.2 Current .....	-15 to +15 $\mu$ A
Field Strength of Adjustable Centering magnet 2) .....	0 to 10 gauss

## TYPICAL OPERATING CONDITIONS

Anode Voltage .....	8000 volts
Grid-No.2 Voltage .....	400 volts
Grid-No.3 Voltage for focus 3) .....	0 to 400 volts
Grid-No.1 Voltage for visual extinction of focused raster .....	-22 to -46 volts

## MAXIMUM CIRCUIT VALUES

Grid-No.1 Circuit Resistance .....	1.5 max. megohms
------------------------------------	------------------

## CATHODE-DRIVE SERVICE

Unless otherwise specified, voltage values are positive with respect to Grid-No.1

## MAXIMUM AND MINIMUM RATINGS (Design-Maximum Values)

Anode Voltage .....	10000 max volts 7000 min volts
Grid-No.3 (Focusing) Voltage:	
Positive value .....	1100 max volts
Negative value .....	550 max volts
Grid-No.2 Voltage .....	{ 550 max volts 250 min volts
Cathode Voltage:	
Positive-bias value .....	125 max volts
Negative-bias value .....	0 max volts
Negative-peak value .....	2 max volts
Heater voltage .....	{ 13.9 max volts 11.3 min volts
Peak Heater-Cathode Voltage 1)	
Combined AC & DC Voltage .....	130 max volts
DC Component .....	80 max volts

### EQUIPMENT DESIGN RANGES

Grid-No.3 Current .....	-25 to +25 $\mu$ A
Grid-No.2 Current .....	-15 to +15 $\mu$ A
Field Strength of Adjustable Centering magnet 2) .....	0 to 10 gaussess

### TYPICAL OPERATING CONDITIONS

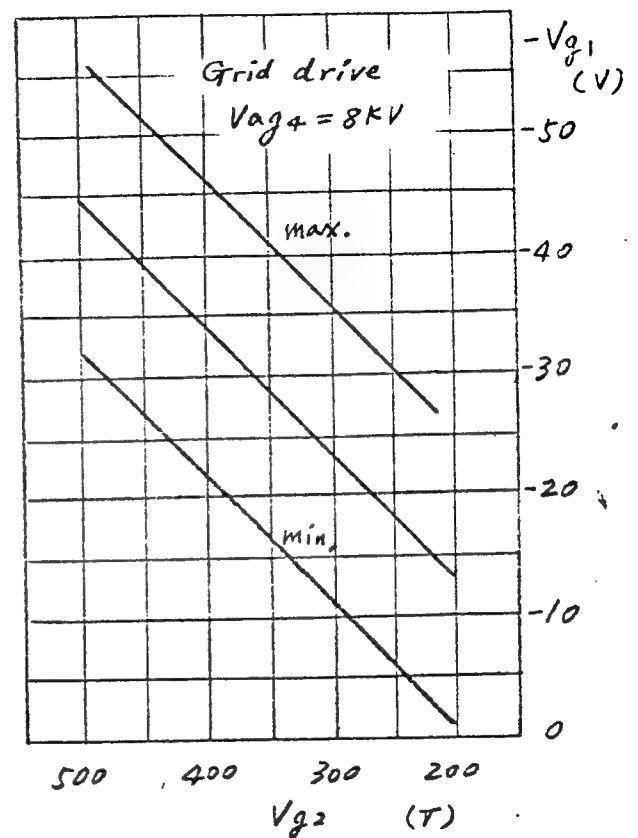
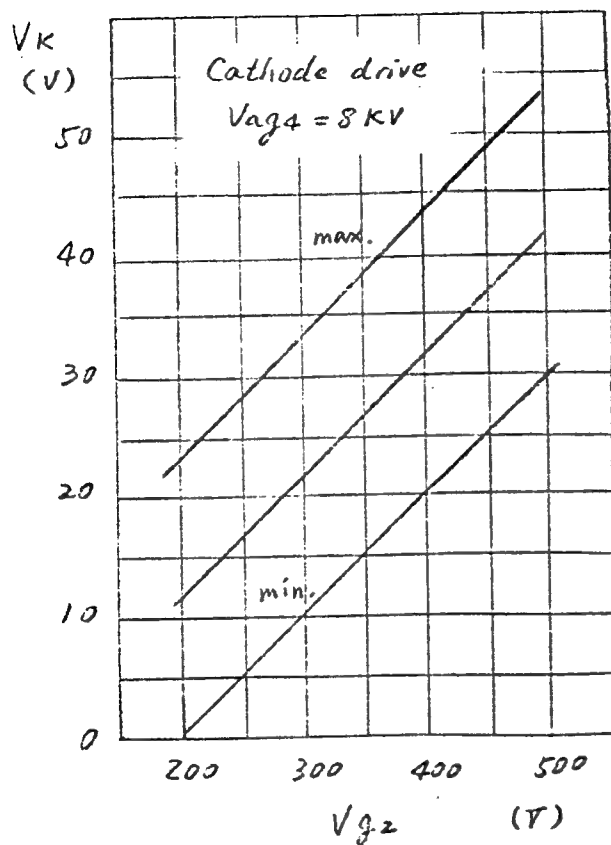
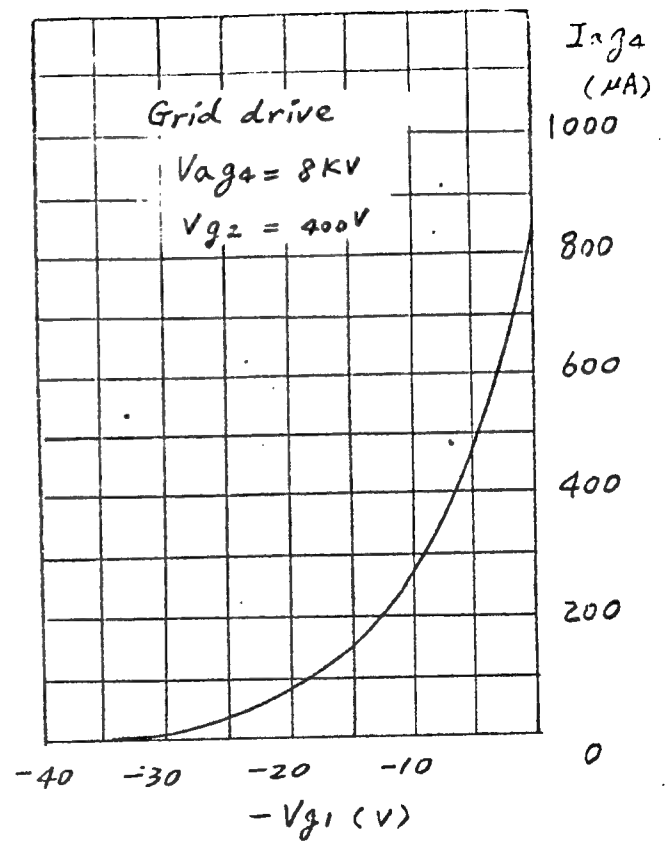
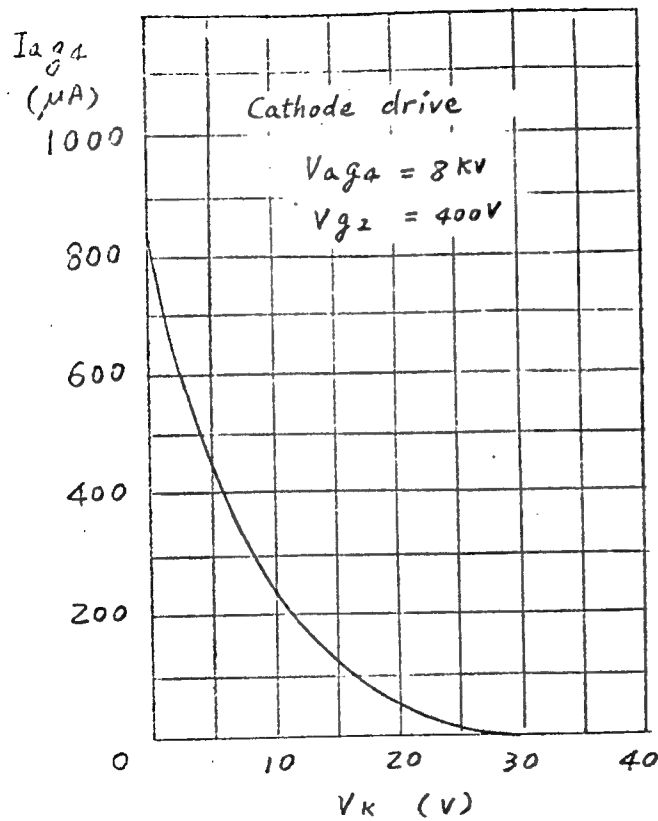
Anode Voltage .....	8000 volts
Grid-No.2 Voltage .....	400 volts
Grid-No.3 Voltage for focus 3) .....	0 to 400 volts
extinction of focused raster .....	20 to 43 volts

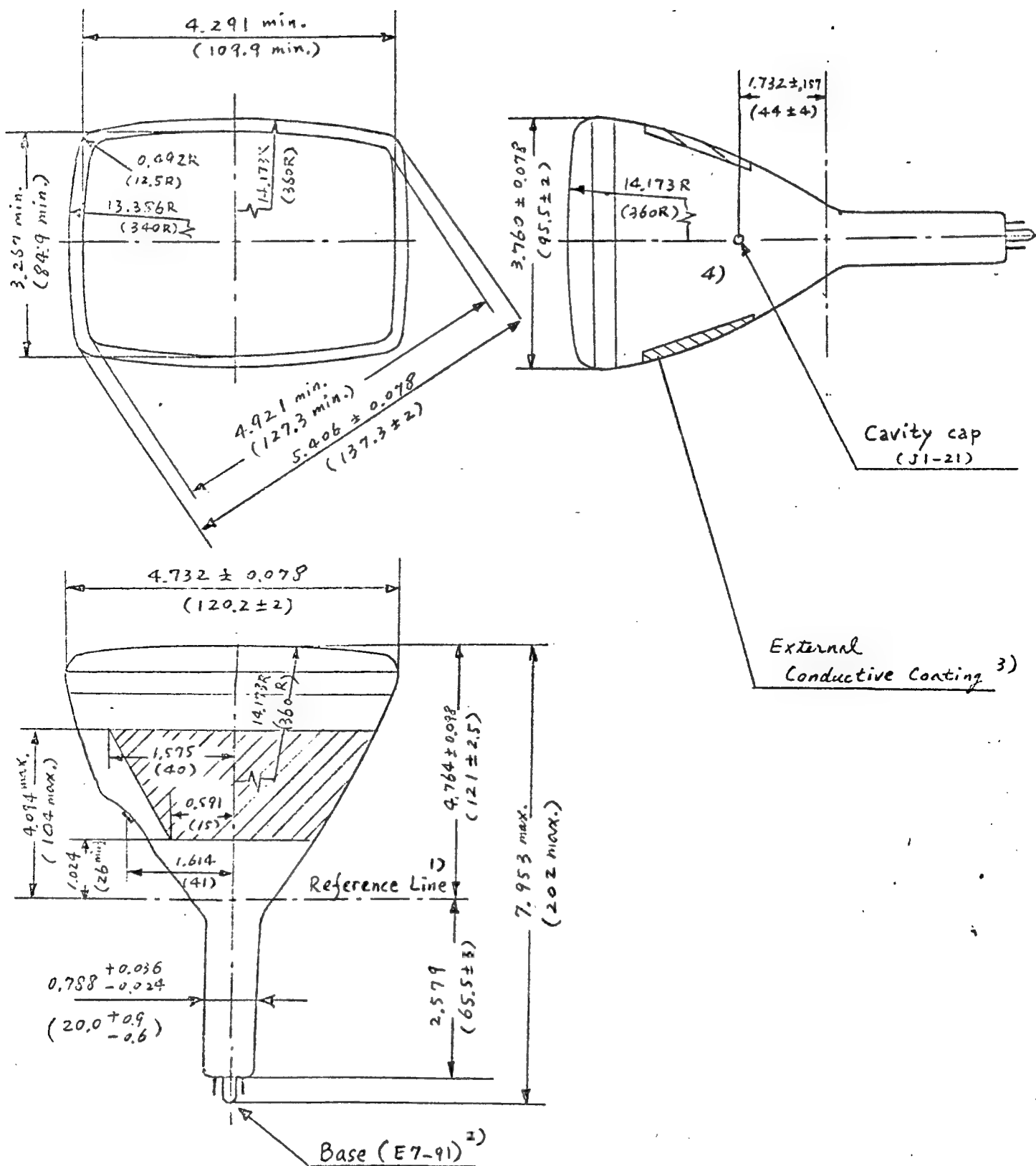
### MAXIMUM CIRCUIT VALUES

Grid-No.1 Circuit Resistance .....	1.5 max negohms
------------------------------------	-----------------

### NOTES

- 1) To avoid excessive hum the AC component of the heater to chassis voltage should be as low as possible and must not exceed 20V r.m.s.
- 2) The maximum distance between the centre of the field of this magnet and the reference line is 1.42" (36 mm).  
The centring magnet should be mounted as close to the deflection coils as possible.
- 3) Voltage range necessary to obtain optimum overall focus at a beam current of 55  $\mu$ A.





Dimensions in Inches (mm)

140AKB4  
Sheet 6 of 7

NOTES (Concerning Sheet 6)

- 1) The reference line is determined by Reference line gauge JEDEC Type No. G-R55J1.
- 2) The socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. The bottom circumference of the base wafer will fall within a circle concentric with the bulb axis and having a diameter of 1.58" (40 mm).
- 3) The configuration of the outer coating is optional, but must contain the contact area as shown in the drawing.  
The external coating must be earthed.
- 4) This area must be kept clean.

HCS  
35

PC-123

## Deflection Amp alignment

power off

adjust R12 CW all the way. Then face east, kneel down

power on

adjust R25 for gain (signal on pin 1 only)

adjust R10 with signal on pins 1 and 2 for Null

adjust R12 <sup>ccw</sup> for no crossover and no oscillation

adjust R24 for centering picture

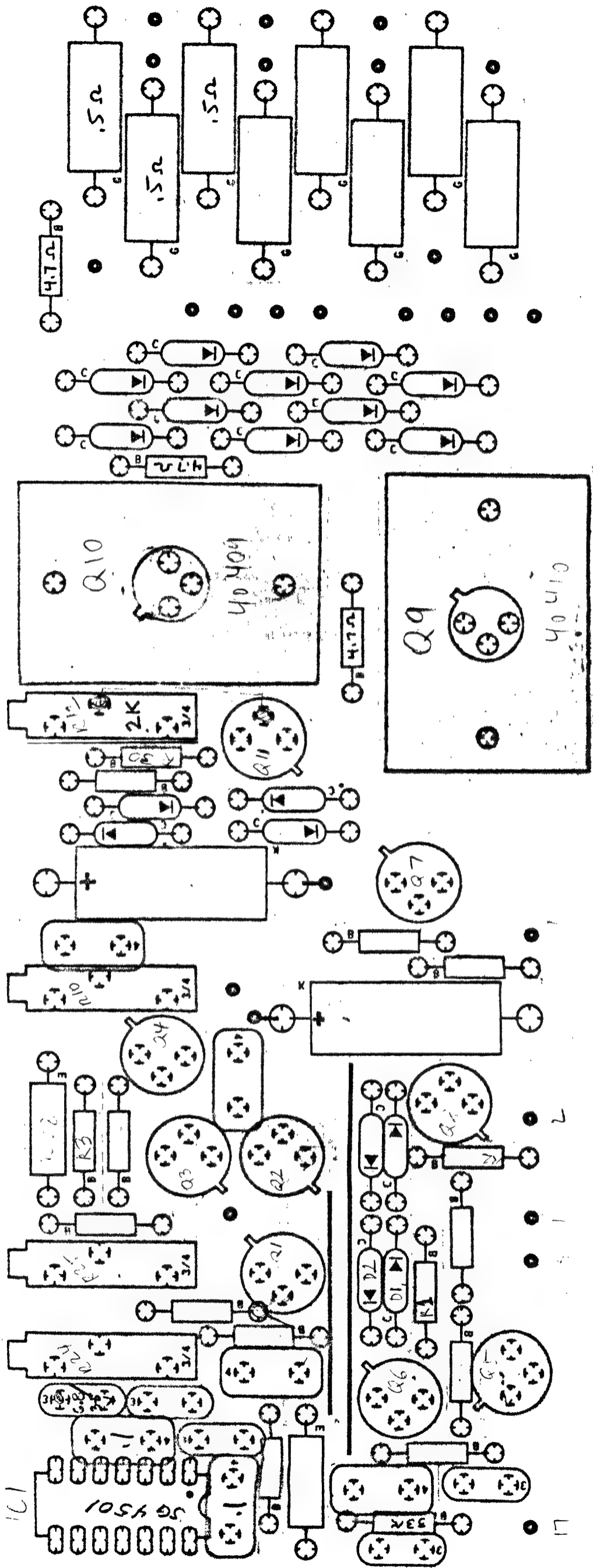
when brown, remove from heatsink



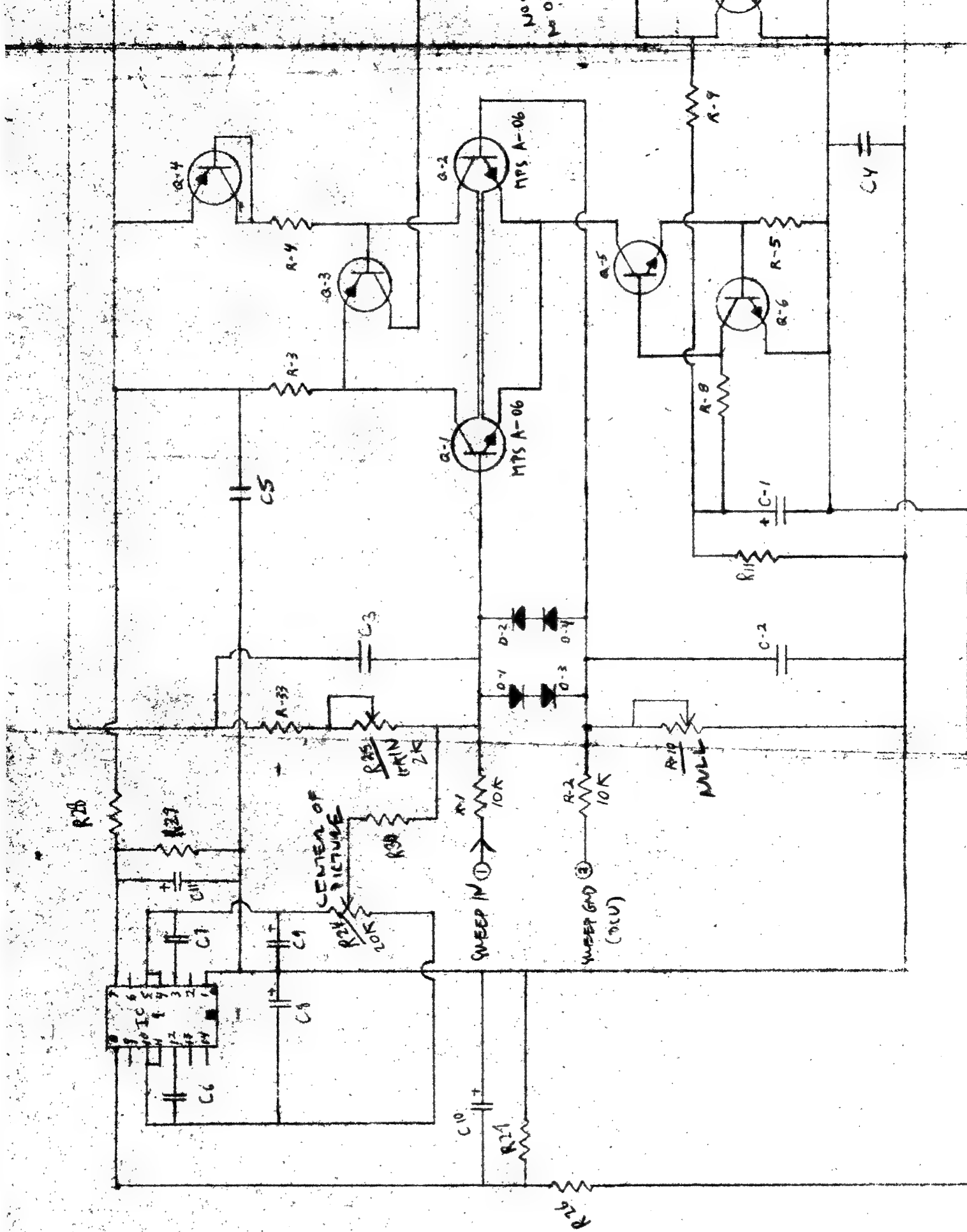
.25  $\Omega$  FEEDBACK SHUNT; 1 AMP = 250 MV  
4 AMPS = 1 VOLT

HCS  
14

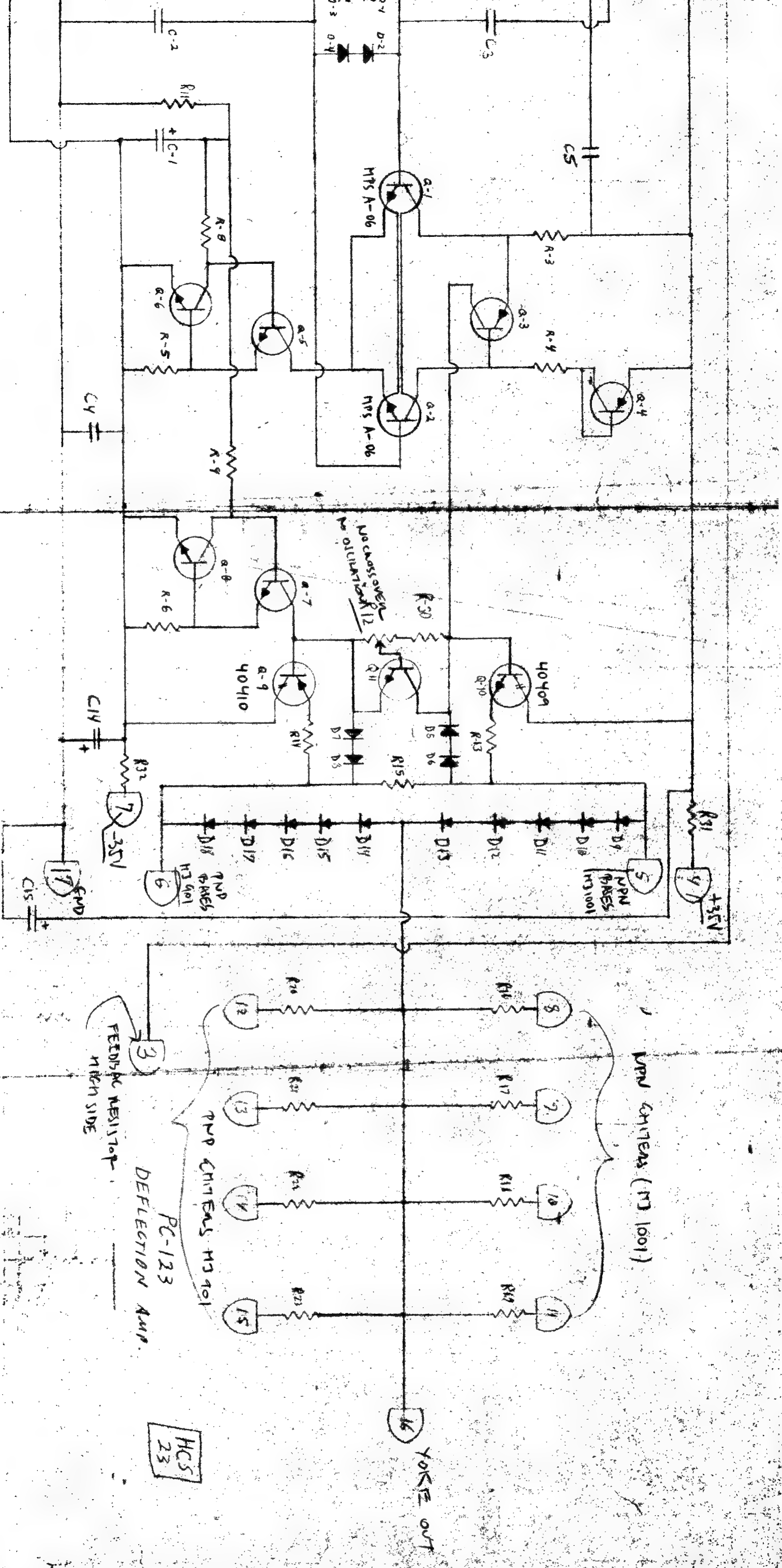
PC123



PC 123 Deflection Amp



7C 123



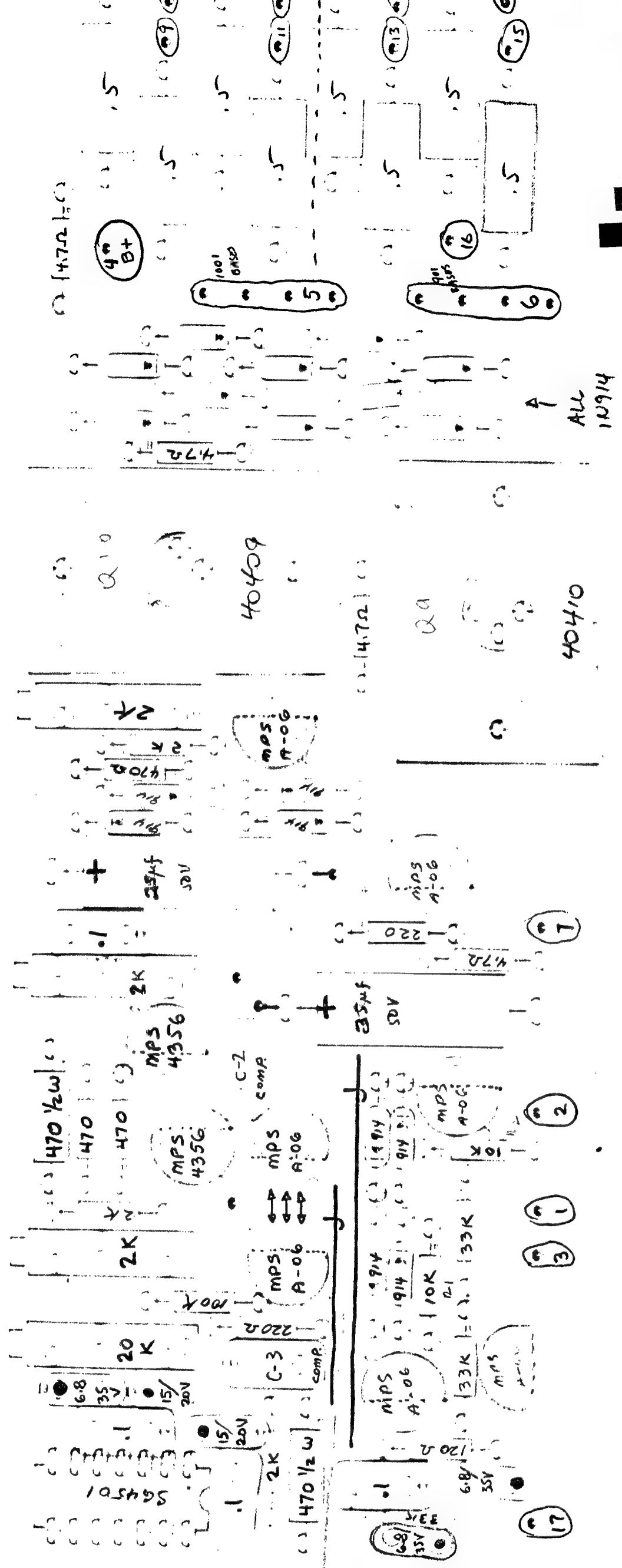
PC-123

TERMINALS:

- 1. SWEEP IN
- 2. SWEEP (DC) GND
- 3. FEEDBACK RESISTOR HIGH SIDE
- 4. +35V
- 5. NPN BASES (MJ1001)
- 6. PNP BASES (MJ901)
- 7. -35V
- 8-9-10-11 NPN EMITTERS (MJ1001)

- 12-13-14-15 PNP EMITTERS (MJ901)
- 16 - 10K $\Omega$  OUT
- 17 - GND

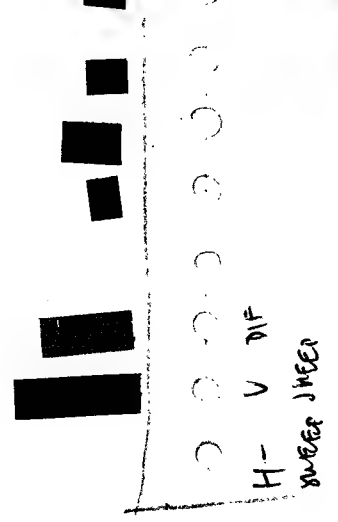
# PC 123 DEFLECTION AMP.



THESE ARE PUT IN WITH LOW LEADS, TURNED OVER AND MOUNTED FLAT-TO-FLAT THEN TIED TOGETHER WITH SILICONE GOOP BETWEEN THEM.



170 123  
123 123  
123 123





PC-125

D-1 7.1V ZENER  
D-2 7.1V ZENER  
D-3 1.491V  
D-4 11  
D-5 11  
D-6 11

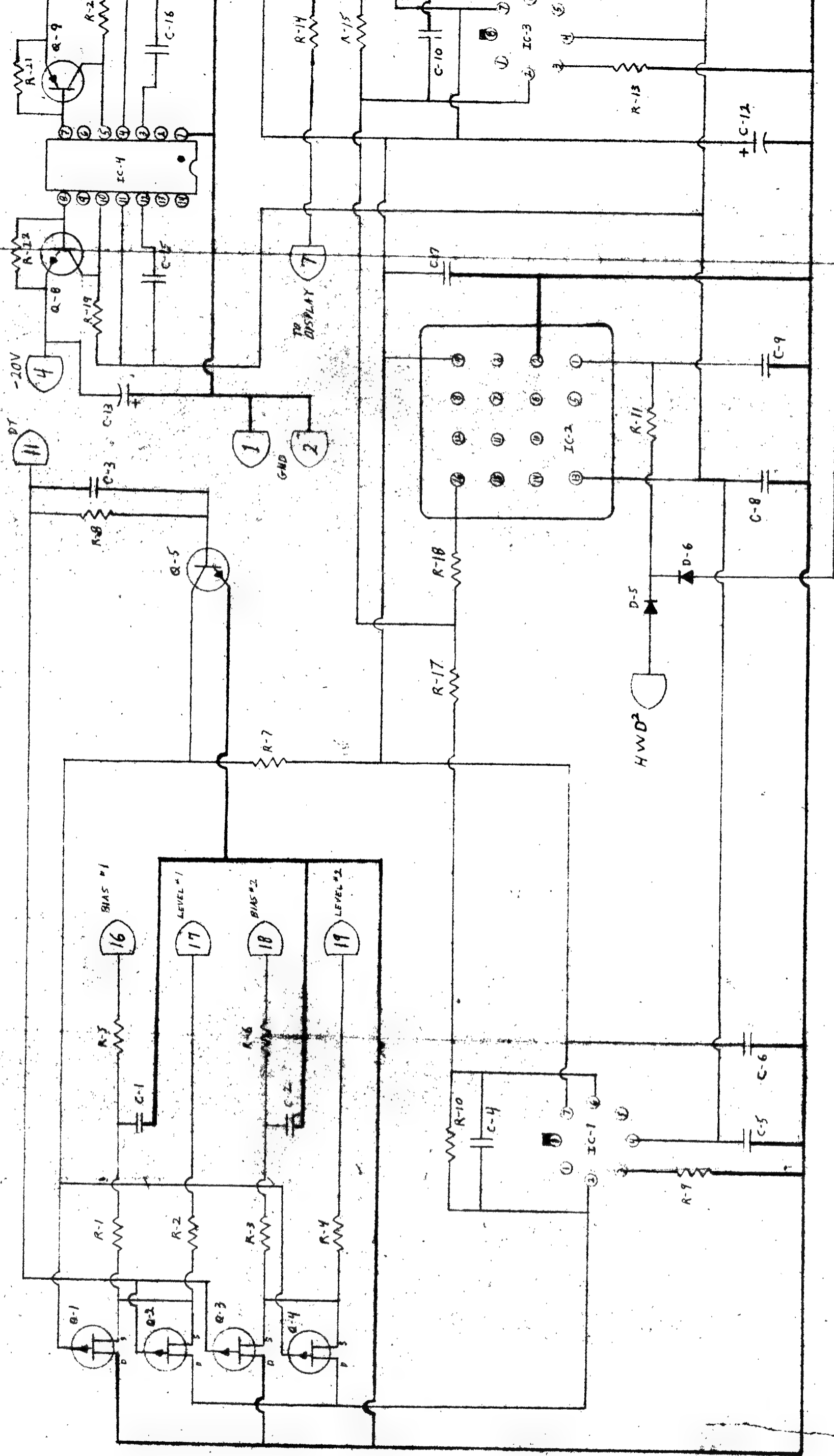
C-1 100PF  
C-2 100PF  
C-3 100PF  
C-4 5PF  
C-5 .1  
C-6 .1  
C-7 .1  
C-8 .1  
C-9 .01  
C-10 100PF  
C-11 150V 22V  
C-12 150V 22V  
C-13 74 35V  
C-14 74 35V  
C-15 74 35V  
C-16 .1  
C-17 .1  
C-18 .1  
C-19 .1  
C-20 .1  
C-21 .1  
C-22 .1  
C-23 .1  
C-24 .1  
C-25 .1  
C-26 .1  
C-27 .1  
C-28 .1  
C-29 .1  
C-30 .1  
C-31 .1  
C-32 .1  
C-33 .1  
C-34 .1  
C-35 .1  
C-36 .1  
C-37 .1  
C-38 .1  
C-39 .1  
C-40 .1  
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C-42 .1  
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C-56 .1  
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C-58 .1  
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C-60 .1  
C-61 .1  
C-62 .1  
C-63 .1  
C-64 .1  
C-65 .1  
C-66 .1  
C-67 .1  
C-68 .1  
C-69 .1  
C-70 .1  
C-71 .1  
C-72 .1  
C-73 .1  
C-74 .1  
C-75 .1  
C-76 .1  
C-77 .1  
C-78 .1  
C-79 .1  
C-80 .1  
C-81 .1  
C-82 .1  
C-83 .1  
C-84 .1  
C-85 .1  
C-86 .1  
C-87 .1  
C-88 .1  
C-89 .1  
C-90 .1  
C-91 .1  
C-92 .1  
C-93 .1  
C-94 .1  
C-95 .1  
C-96 .1  
C-97 .1  
C-98 .1  
C-99 .1  
C-100 .1

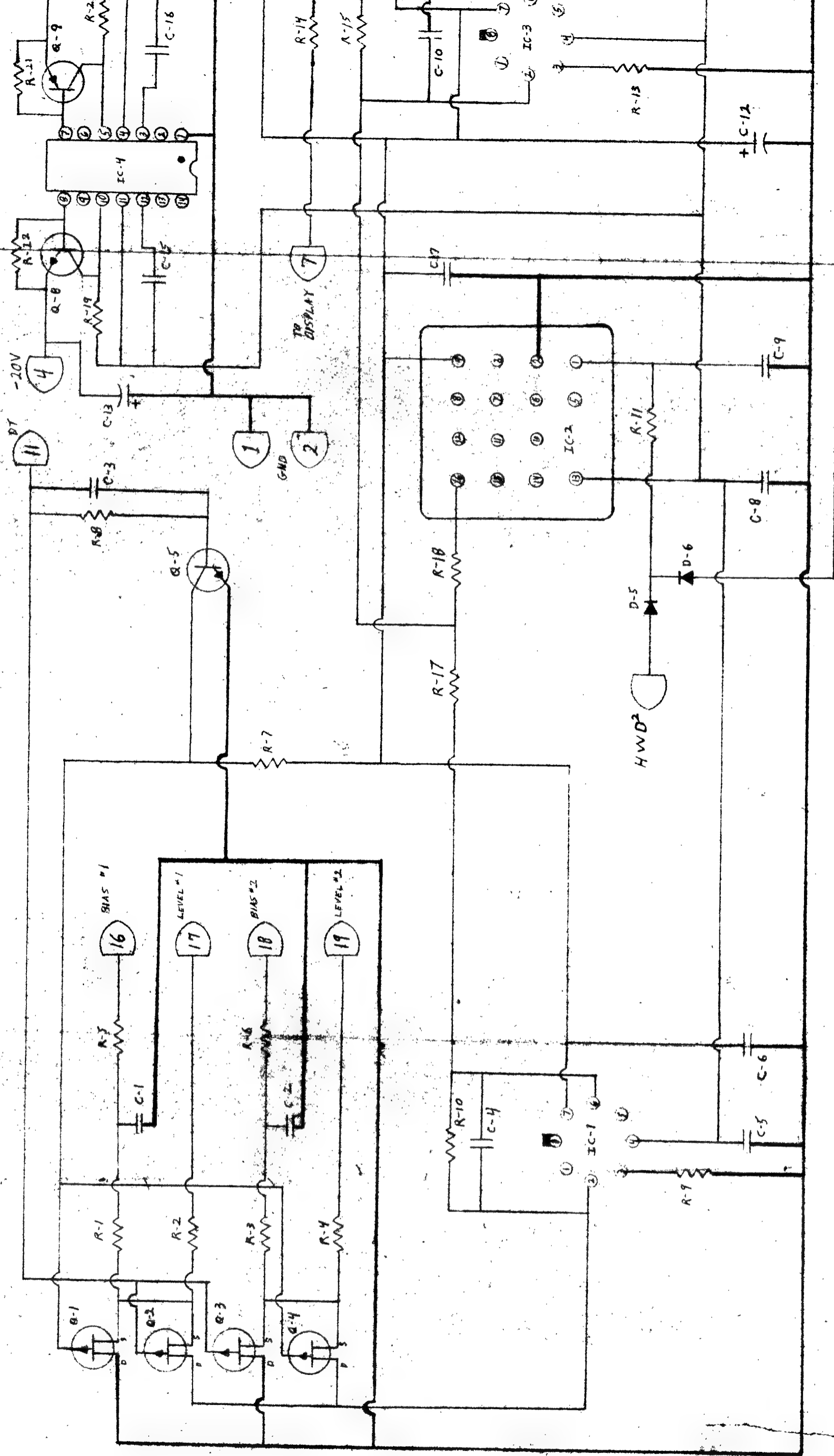
IC-1 LM318 OP-AMP  
IC-2 2357 LOG BUFFER  
IC-3 LM318 OP-AMP  
IC-4 2013 MULTPLIER  
IC-5 2013 MULTPLIER

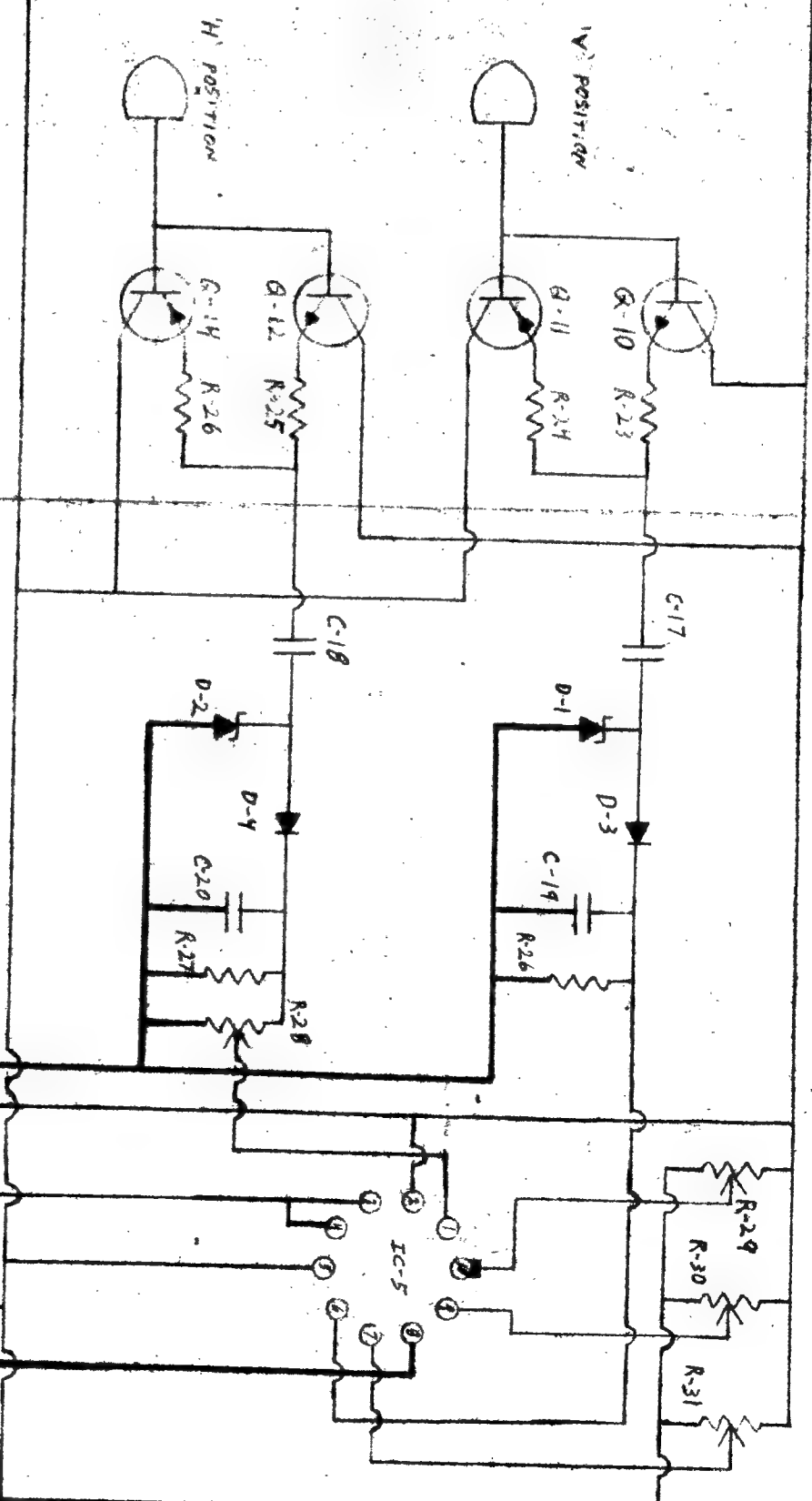
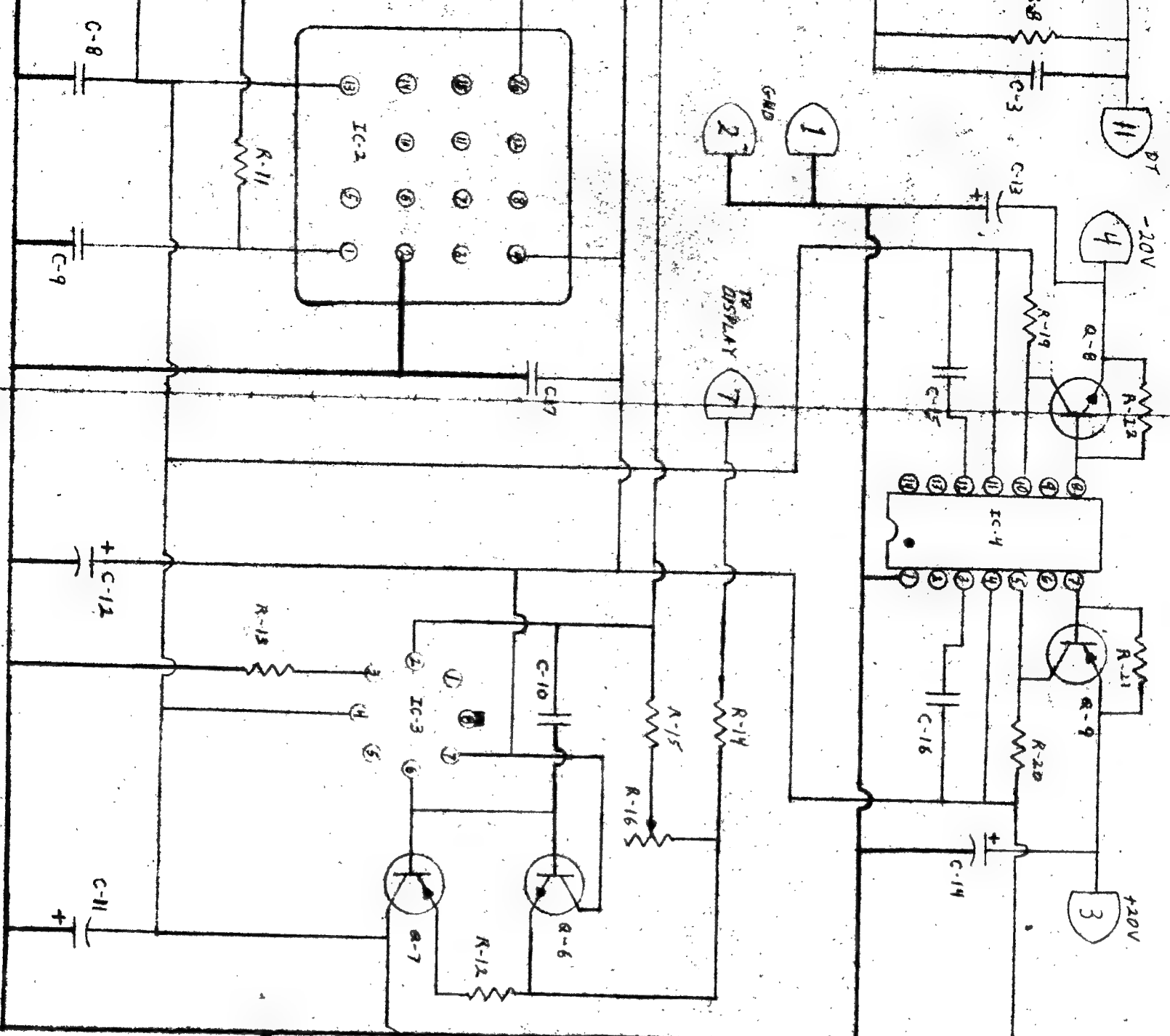
R-1 8.2K  
R-2 10K  
R-3 10K  
R-4 10K  
R-5 10K  
R-6 10K  
R-7 10K  
R-8 100K  
R-9 4.7K  
R-10 22K  
R-11 4.7K  
R-12 10K  
R-13 2.2K  
R-14 75K  
R-15 5K  
R-16 100K  
R-17 33K  
R-18 2K  
R-19 5.6K  
R-20 10K  
R-21 10K  
R-22 10K  
R-23 1K  
R-24 1K  
R-25 1K  
R-26 1K  
R-27 10K  
R-28 10K  
R-29 10K  
R-30 10K  
R-31 10K  
R-32 10K  
R-33 10K  
R-34 10K  
R-35 10K  
R-36 10K  
R-37 10K  
R-38 10K  
R-39 10K  
R-40 10K  
R-41 10K  
R-42 10K  
R-43 10K  
R-44 10K  
R-45 10K  
R-46 10K  
R-47 10K  
R-48 10K  
R-49 10K  
R-50 10K  
R-51 10K  
R-52 10K  
R-53 10K  
R-54 10K  
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R-56 10K  
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R-60 10K  
R-61 10K  
R-62 10K  
R-63 10K  
R-64 10K  
R-65 10K  
R-66 10K  
R-67 10K  
R-68 10K  
R-69 10K  
R-70 10K  
R-71 10K  
R-72 10K  
R-73 10K  
R-74 10K  
R-75 10K  
R-76 10K  
R-77 10K  
R-78 10K  
R-79 10K  
R-80 10K  
R-81 10K  
R-82 10K  
R-83 10K  
R-84 10K  
R-85 10K  
R-86 10K  
R-87 10K  
R-88 10K  
R-89 10K  
R-90 10K  
R-91 10K  
R-92 10K  
R-93 10K  
R-94 10K  
R-95 10K  
R-96 10K  
R-97 10K  
R-98 10K  
R-99 10K  
R-100 10K

ALL CAPS  
CERAMIC OR  
TANTALUM

HCS  
34



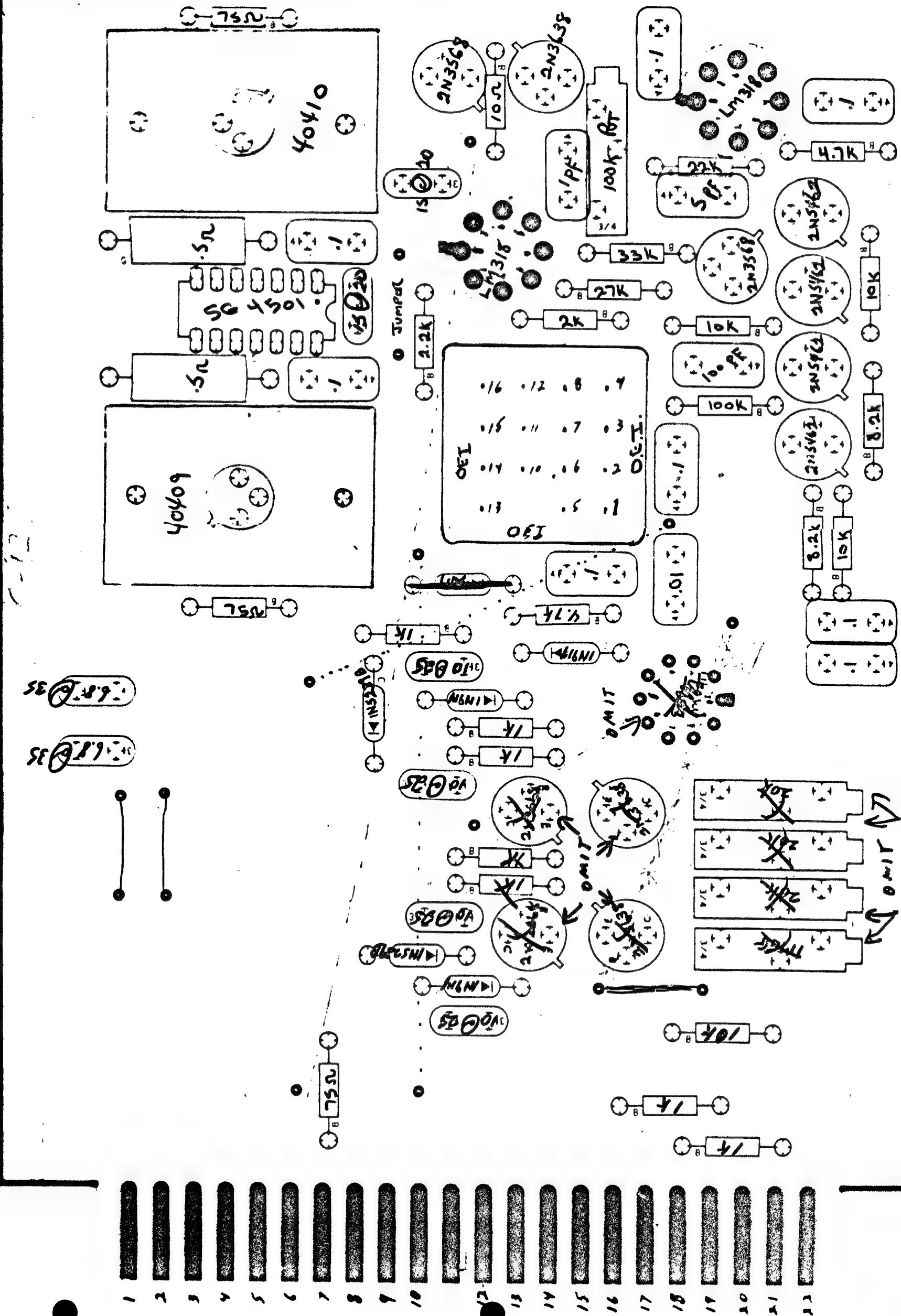




RUTT ELECTROPHYSICS  
AUGUST 7, 1974  
PC-125

HCS  
18

54  
5741



PC-126

1 2013

2 2013

3 LM 318

4 LM 318

5 2013

6 SG 4501

1 4040?

2 4040?

7-1 1N914

7-2 11

-C-1 .14 CER

-C-2 .14 CER

-C-3 154 20V TANT.

-C-4 154 20V 11

-C-5 .14 CER

-C-6 .14 CER

-C-7 6.8K 5%

-C-8

-R-1 20K POT DEPTH<sup>2</sup> GAIN

-R-2 20K POT (H,X,W) GAIN

-R-3 20K POT DEPTH ZERO

-R-4 11 OUTPUT OFFSET

-R-5 11 JUMPER ZERO

-R-6 11 HEIGHT ZERO

-R-7 11 OUTPUT OFFSET

-R-8 11 WIDTH ZERO

-R-9 20K 5%

-R-10 10K

-R-11 20K 5%

-R-12 10K

-R-13 20K 5%

-R-14 10K 5%

-R-15 20K 5%

-R-16 20K POT OUTPUT GAIN

-R-17 11 DELTA OUT ZERO

-R-18 11 OUT ZERO

-R-19 11 H W OUT ZERO

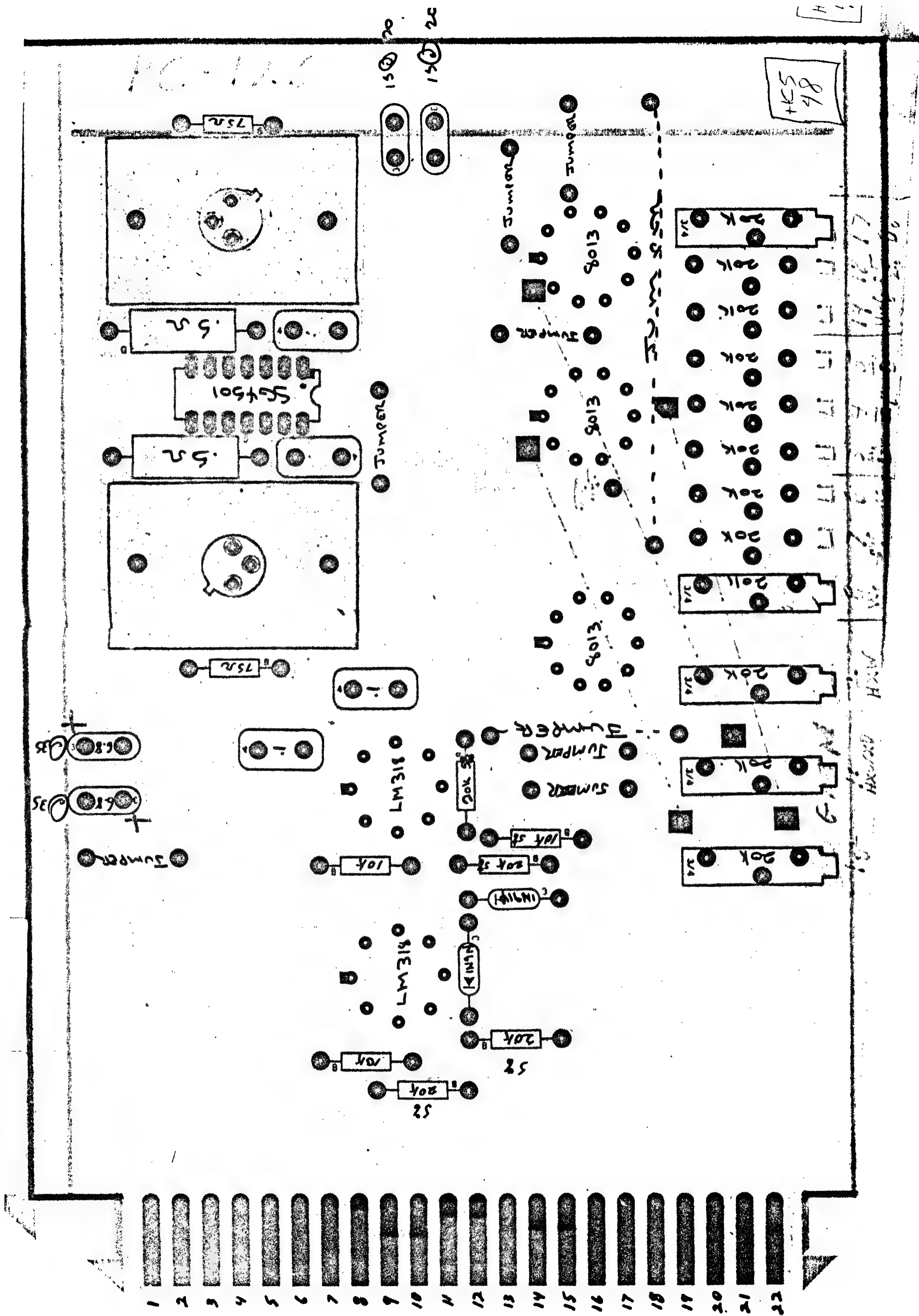
-R-20 .5W Dale

-R-21 .5W Dale

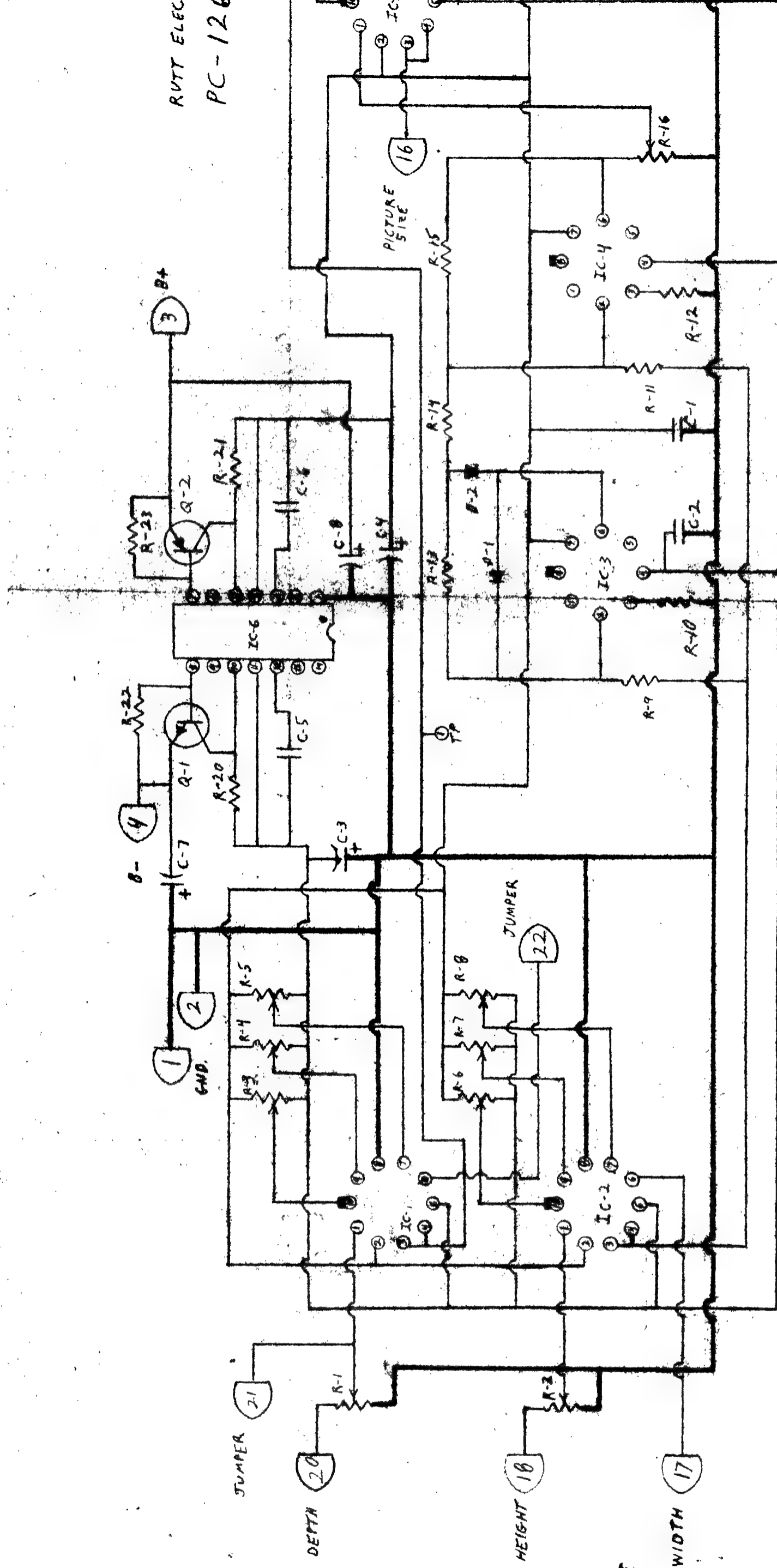
-R-22 75R

-R-23 75R

HCS  
33



RVTY ELEC  
PC-126





PC-126, RUT ELECTROPHYSICS



# RUTT ELECTROPHYSICS

21-29 West 4th Street, New York, N.Y., 10012 (212) 982-8300

IC-1 MC1494  
IC-2 LM 318  
IC-3 LM 318  
IC-4 LM 318

D-1 1N914  
D-2 1N914  
D-3 1N914  
D-4 1N914  
D-5 1N914  
D-6 1N914

Q-1 NPN 2N3568  
Q-2 PNP 2N3638  
Q-3 NPN 2N3568  
Q-4 PNP 2N3638

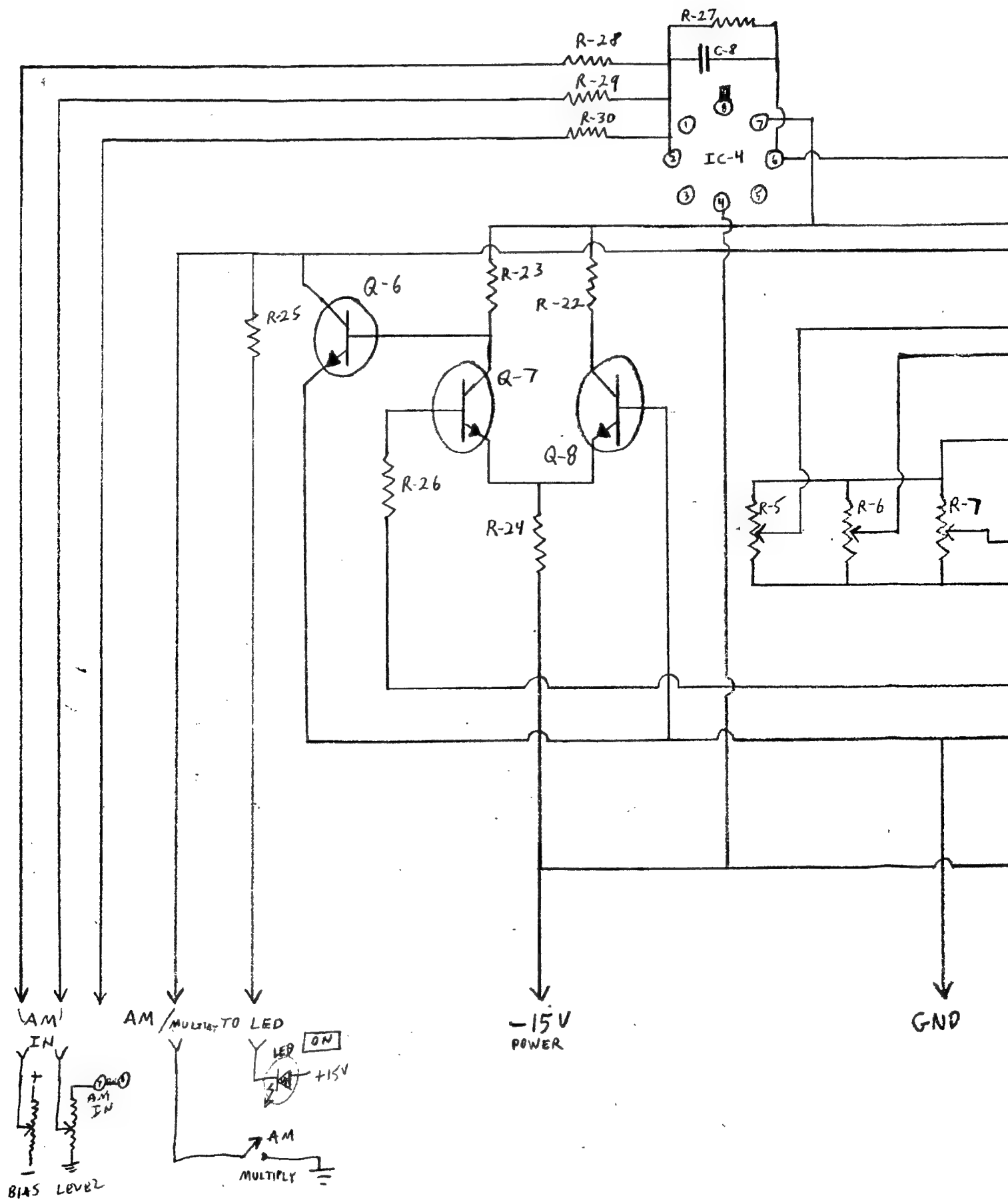
C-1 10 PF  
C-2 10 PF  
C-3 150F 20V  
C-4 150F 20V  
C-5 10 PF  
C-6 .1 cer  
C-7 .1 cer  
C-8 10 PF  
C-9 .1 cer

PC 127A  
JAN 29, 75

Q-5 FET 2N5462  
Q-6 NPN 2N3568  
Q-7 NPN 2N3568  
Q-8 NPN 2N3568

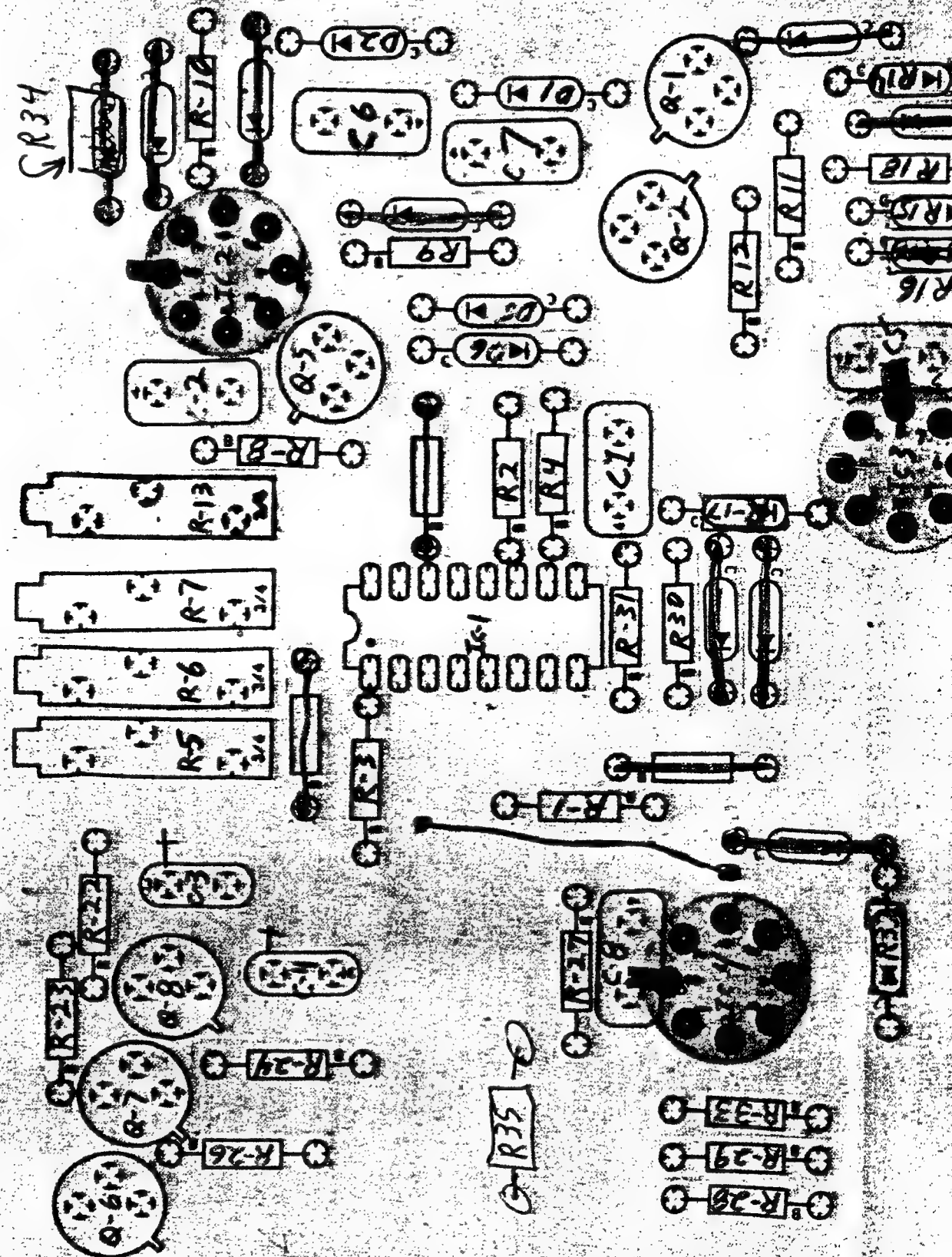
R-1 27K  
R-2 15K  
R-3 12K  
R-4 510Ω  
R-5 20K pot  
R-6 20K pot  
R-7 20K pot  
R-8 47K  
R-9 10K  
R-10 10K  
R-11 10Ω  
R-12 10Ω

R-13 20K pot  
R-14 150Ω  
R-15 10K  
R-16 10K  
R-17 10K  
R-18 10K  
R-19 10Ω  
R-20 10Ω  
R-21 150Ω  
R-22 6.8K  
R-23 20K  
R-24 6.8K  
R-25  
R-26 10K  
R-27 20K  
R-28 15K  
R-29 10K  
R-30 2.2K  
R-31 10K  
R-32 4.7K  
R-33 omit  
R-34  
R-35 10K  
R-36 4.7K



PC-127A

JAN 29, 75

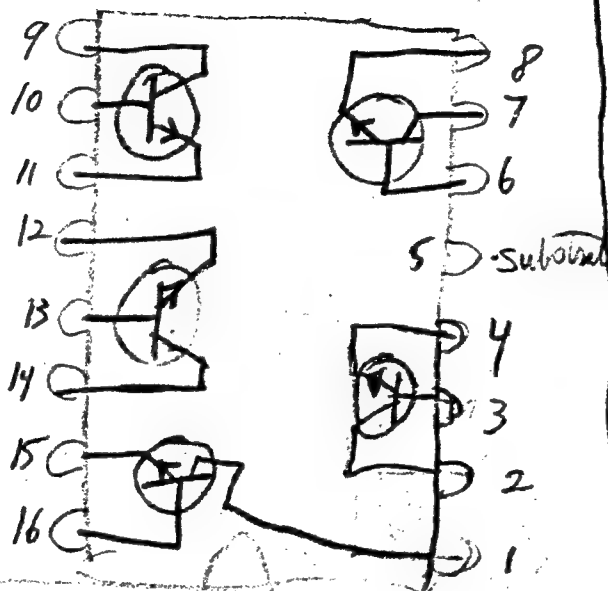
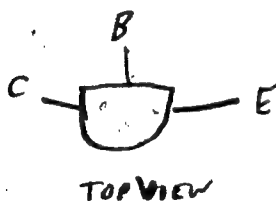


# PC-132 VIDEO DRIVER CORRECTIONS

- 1) R30, IC-10 pin 2, Q-4 BASE ARE NOT SUPPOSED TO GO TO GND
- 2) IC-10 pin 7 & OTHER COMPONENT ON SAME WIRE SHOULD ALSO GO TO -15V
- 3) R-44 IS NOT GROUND

21) Change G-1 FROM 0 TO -28 TO 15  
22) convert R8 & R10  
THEY GO TO WRONG POINTS  
ON IC-10-3

CA-3083

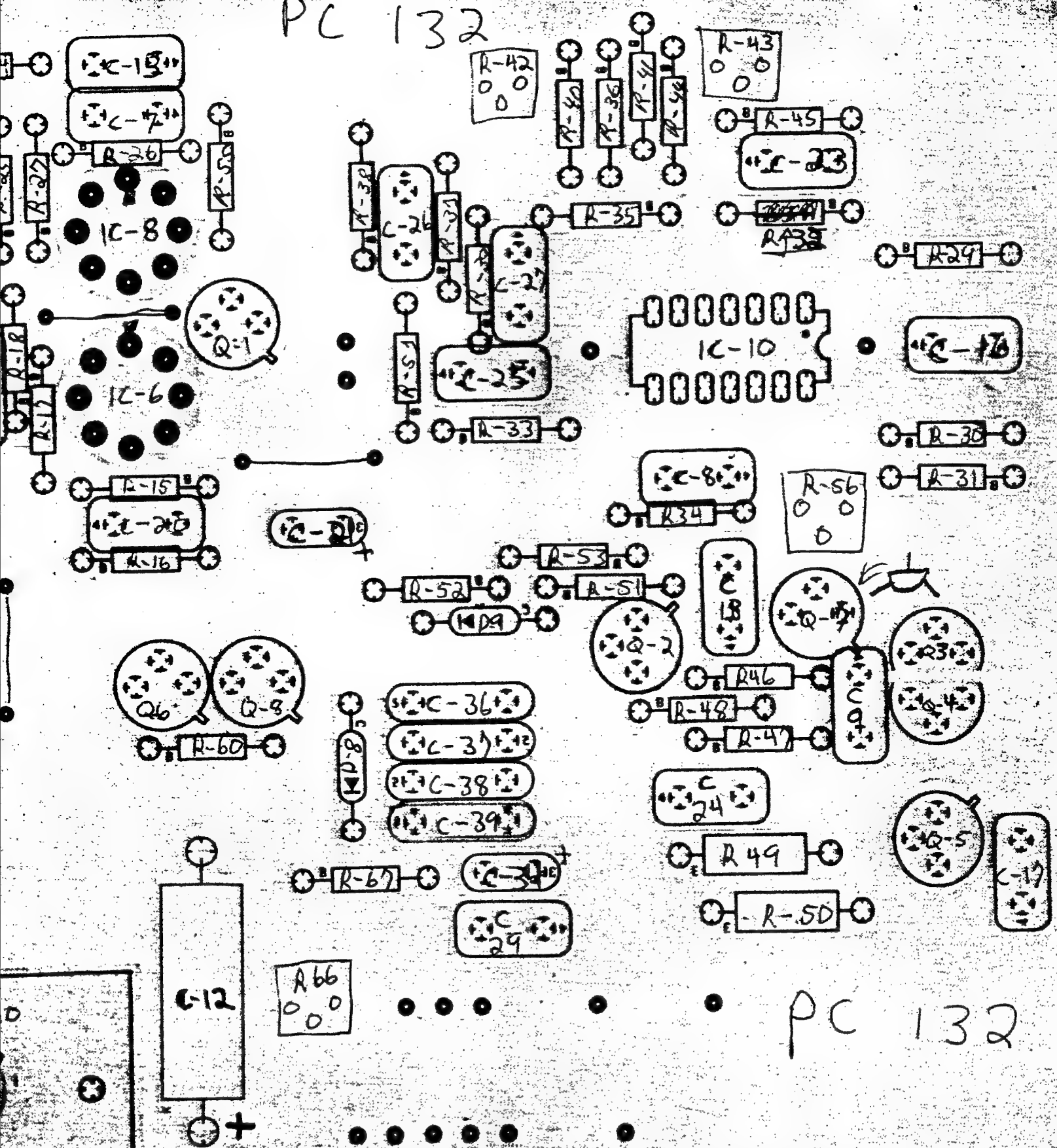


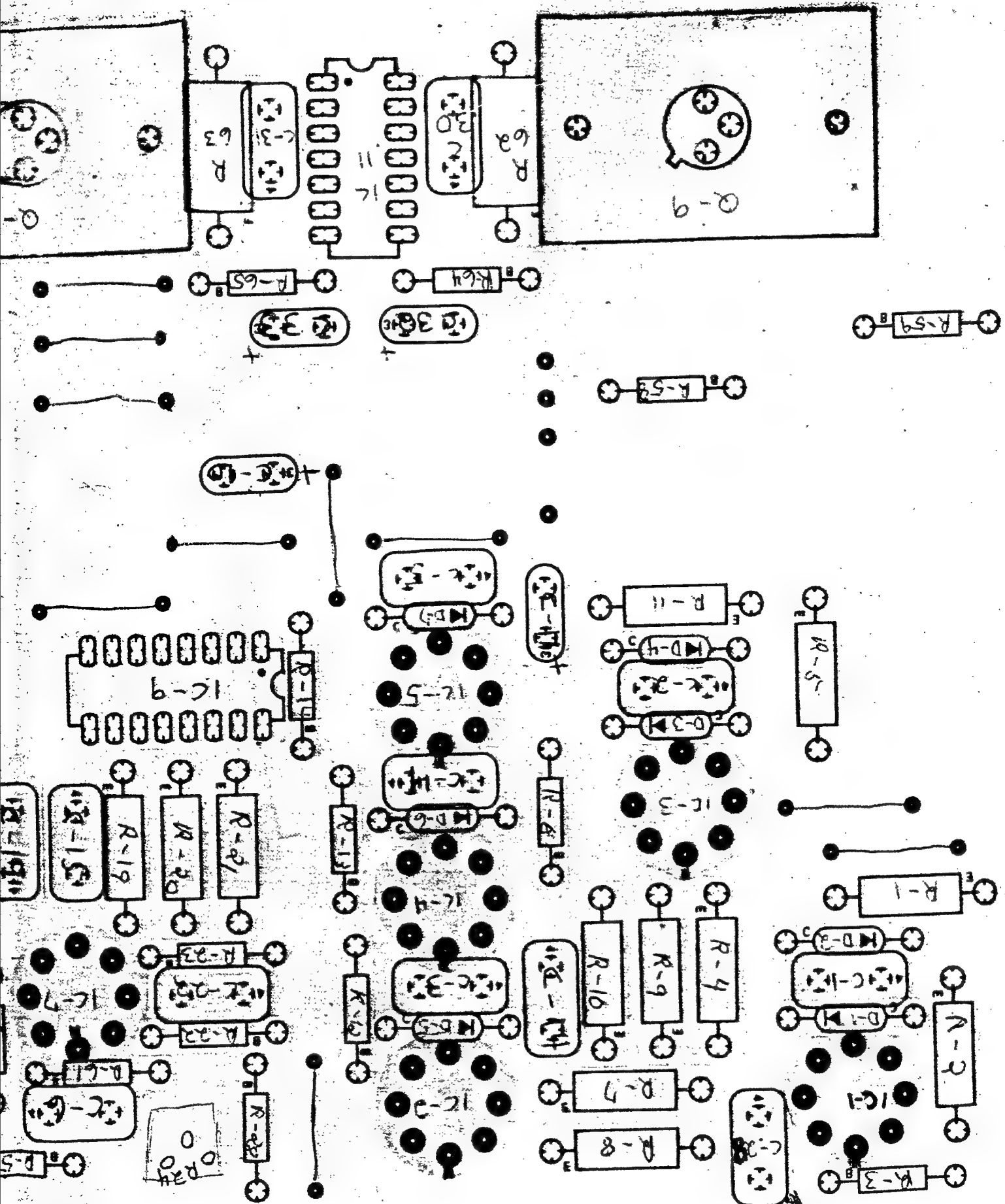
- |   |  |
|---|--|
| 21) ADD   | 19) Reduce VALUE of R61  |
| 20) ADD 10K Res in series w/ 6-2                                    | 20) PUT LIMIT POT ON INTENSITY (OCU) & BIAS POT TO SET EXT INT. AS SPECIFIED |
| 18) ADD 10K Res in series w/ 6-2                                    | 17) PUT 47K Resistor IN SERIES WITH CATHODE                                  |
| 16) ADD 330 RESISTORS INSTEAD OF CAPACITORS 0.1 + 0 - 28V TO 564501 | 15) ADD 10K CAP TO IC-8 pin 2-6  |

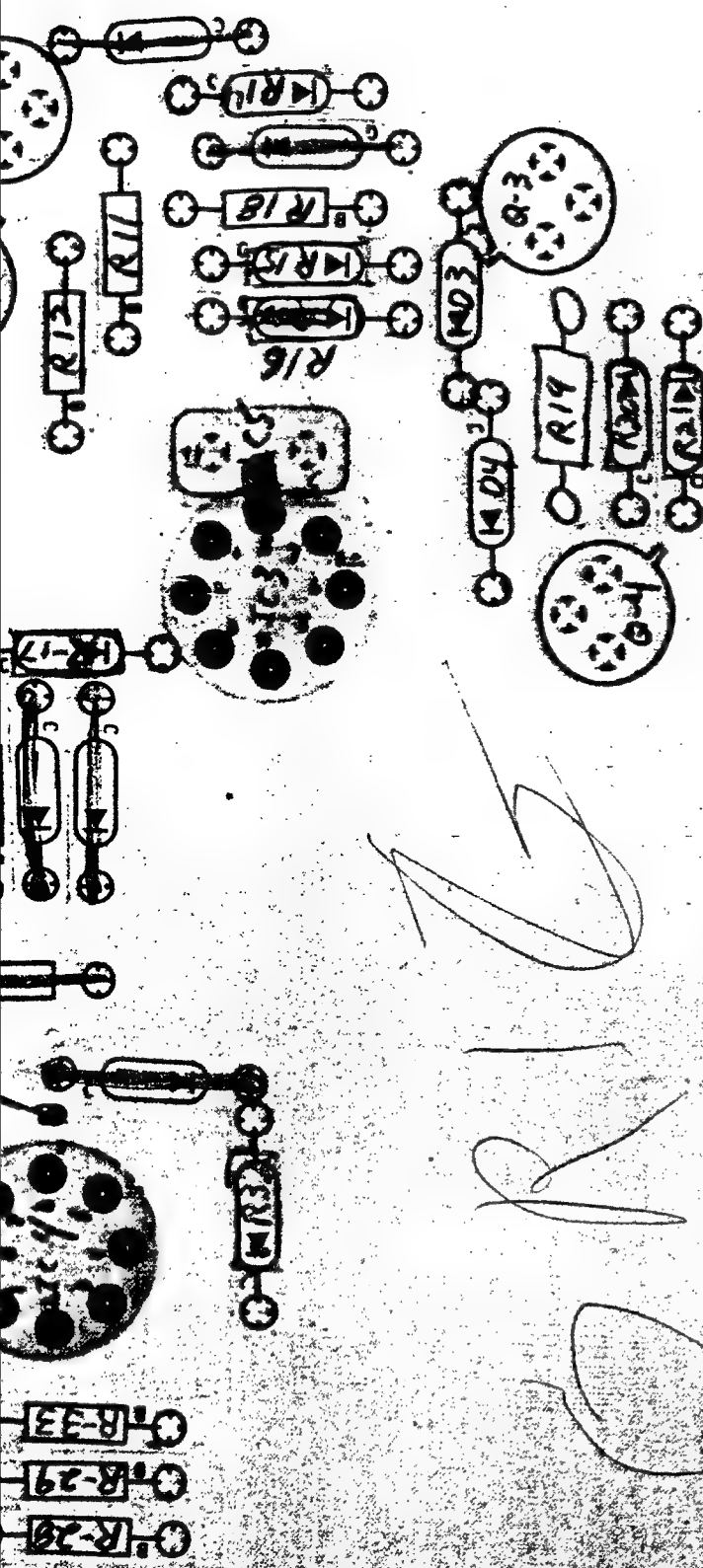
- 4) IC 2 Pin 2 & 4 are MESSSED UP  
CONNECT PIN 4 TO B-  
CUT B- FROM PIN 2 & CONNECT PIN 2 TO 05+CS

OVER

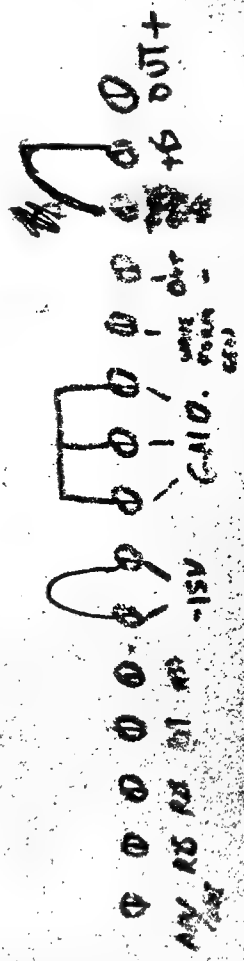
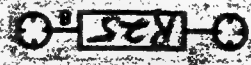
PC 132

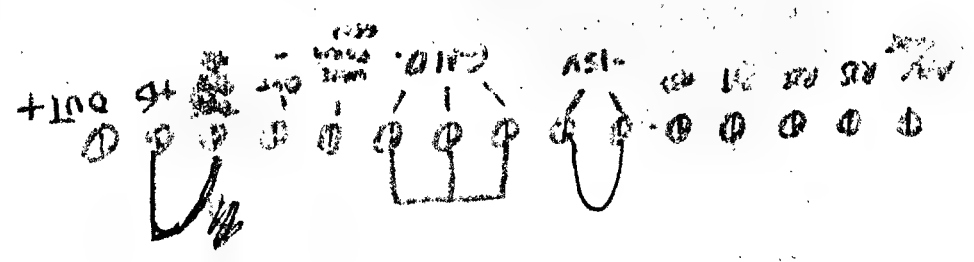
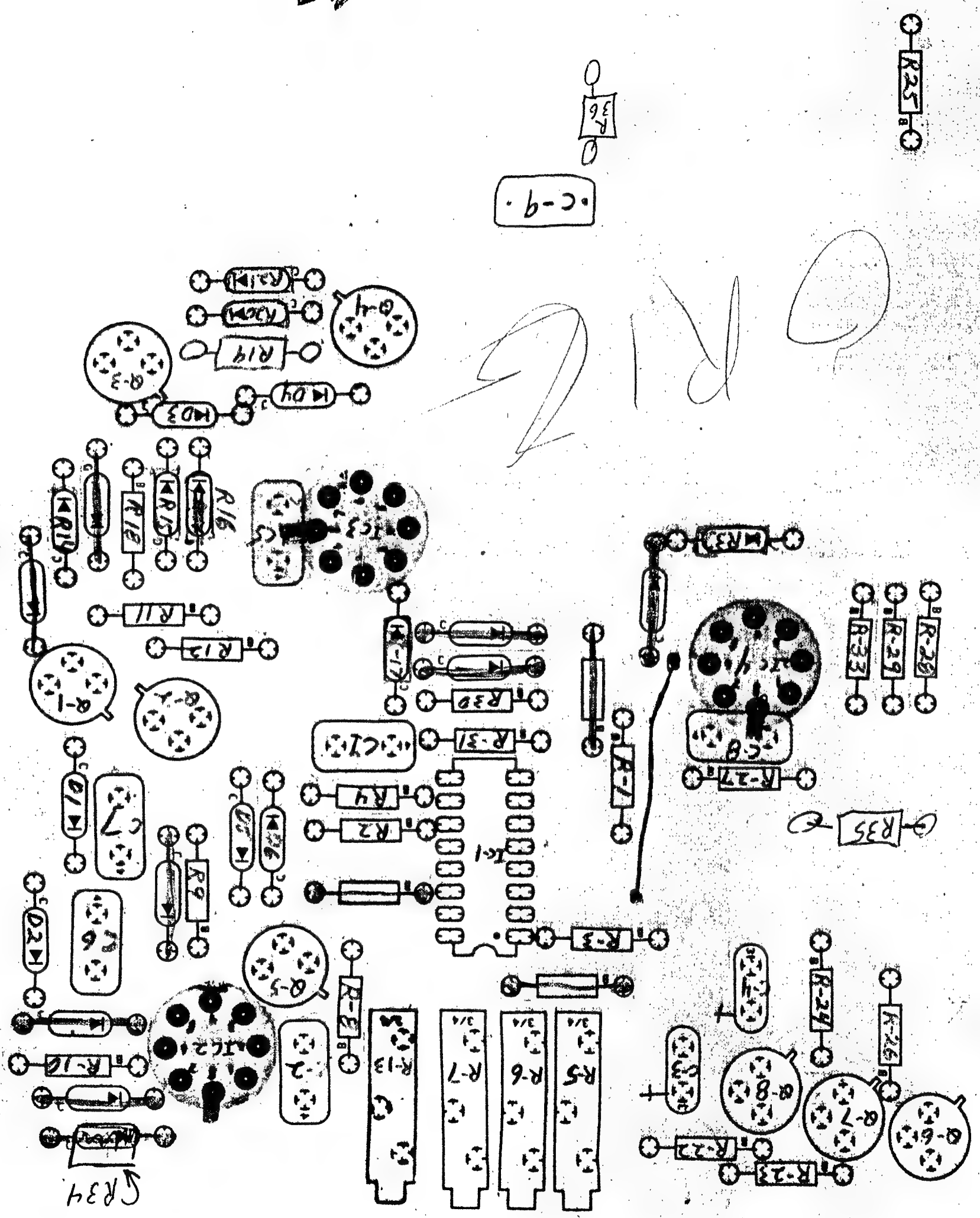






C-9.





C-9

R-25

R-28  
R-29  
R-33

R-35

R-26

R-24

R-23

R-3

R-27

R-7

R-36

R-30  
R-31  
R-32  
R-37

R-5  
R-6  
R-7  
R-13

R-4  
R-2  
R-3

R-10  
R-11  
R-12  
R-16  
R-17  
R-18  
R-19

R-14  
R-15  
R-16  
R-17  
R-18  
R-19

R-1  
R-2  
R-3  
R-4  
R-5  
R-6  
R-7  
R-8  
R-9  
R-10  
R-11  
R-12  
R-13  
R-14  
R-15  
R-16  
R-17  
R-18  
R-19

R-34

Corrections to PC 132

- 1) R30, IC-10, and Q4 base; are not supposed to go to +15
- 2) IC-10 / Pin 7 and other components, on the same wire, should also go to -15 Volt
- 3) R44 is not grounded
- 4) IC-2 / Pin 2 and 4, are 'messed up'  
Connect Pin 4 to B-  
Cut B- from Pin 2 and reconnect Pin 2 to : D5 and C3
- 5) Put resistors in series with the +28Volt and -28 Volt to limit the 40409,40410 power dissipation.
- 6) Crossed off but was: 'Change c-21 to 0.1 uf cer, or 2 tantalums back to back'. This number is no longer in effect
- 7) Change R44 to 10k ohms, from 100k ohms (this change is noted on parts list)
- 8) Change R54 to 220k ohms (this change is noted on parts list)
- 9) Add 470k ohm resistor, from ( C22, R28, R22 junction) to Pin2 of IC-8 . This offsets log circuit, to help linearize the Intensity Input.
- 10) Change R44 from 10k ohms to 4.7k ohms, (change noted on parts list).
  - A) " White Stretch, is 'OFF', when pot. is C.W.
  - B) R46 and R47, control the gain of the Multiply amp. If gain is too high, (too much contrast), Raise their value (in proportion) , and lower C9 by the same proportion, and you will reduce gain.
- 11) Add 2.7 ohm resistor, in series with B-, to Q2, R51, C18 junction.
- 12) Change C-18 to 15 uf (microfarad) at 20 Volt, Tantalum. The plus(+) side is the ground side.
- 13) Change C16 to 15 uf (microFarad) at 25 Volt.
- 14) Omit C13 ( be sure to change R27 ground.).
- 15) Add a 1 pf (picofarad) capacitor, between IC8/pins 2 and pin 6.
- 16) Add 33 ohm resistors, instead of jumpers, on the + and - 28 Volt lines, going to the SG4501 voltage regulator.
- 17) Place a 47 ohm resistor in series with the cathode.
- 18) Add a 10k ohm resistor in series with G-2

FC-132

all 1/4 W 5% carbon unless marked

I-1- LMSLE

2-

3-

4-

5-

6-

7-

8-

9-

10-

CA3083 → ? 30183 (80V)  
MC1595  
with heat sink

C - 2N3558. on leg

2 - 2N3558

3 - 2N5770

4 - 2N5770

5 - 2N2219A

6 - 2N3558

7 - 2N5770

8 - 2N3646

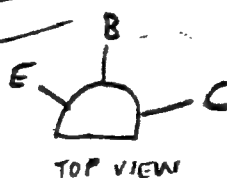
D.I

thru - 1N914A

D7

Note: Disk leakage  
measure less than  
1 μA at 15V

D-8 9/14



D-9 2N5248B

COMP EAP - ADU FOR HF BANDWIDTH

R1 - 10K 1%

2 - 10K 1%

3 - 4.7K

4 - 10K 1%

5 - 10K 1%

6 - 4.7K

7 - 10K 1%

8 - 5K 1%

9 - 10K 1%

10 - 5K 1%

11 - 5K 1%

12 - 510Ω

13 - 510Ω

14 - 510Ω

15 - 18K

16 - 1K

17 - 4.7K

18 - 4.7K

19 - 20K 1%

20 - 20K 1%

21 - 10K 1%

22 - 100K

23 - 3.3K

24 - 10K trim

25 - 10K

26 - 10K

27 - 4.7K

28 - 4.7K

29 - 510Ω

30 - 510Ω

31 - 510Ω

32 - 510Ω

33 - 100Ω

34 - 220Ω

35 - 220Ω

36 - 1K

R37 - 1K

38 - 100Ω

39 - 1K

40 - 100Ω

41 - 1K

42 - 20K trim

43 - 20K trim

44 - 4.7K

45 - 100K

46 - 10Ω

47 - 100Ω

48 - 680Ω

49 - 510Ω 1/2 W (470)

50 - 510Ω 1/2 W (470)

51 - 1K

52 - 1K

53 - 10K

54 - 220K

55 - 510Ω (470)

56 - 1K trim

R57 75Ω  
R58 1K  
R59 10K  
R60 10K  
R61 2.7K

C1 - 47pF

C2 - 47pF

3 - 47pF

4 - 47pF

5 - 47pF

6 - 10pF

7 - 10pF

8 - 100pF \*

9 - 100pF \*

10 - 15pF/20V

11 - 15pF/20V

12 - 22/50V

13 - .1

14 - .1

15 - .1

16 - .1

17 - .1

C18 - .1

C19 - .1

20 - .1

21 - 15pF/20V

22 - .1

23 - .1

24 - .1

25 - 220pF DISK

26 - 220pF

C27 - .1

C28 - .1

C29 - .1

C30 - .1

C31 - .1

C32 - .1

C33 - .1

C34 - .1

C35 - .1

C36 - .1

C37 - .1

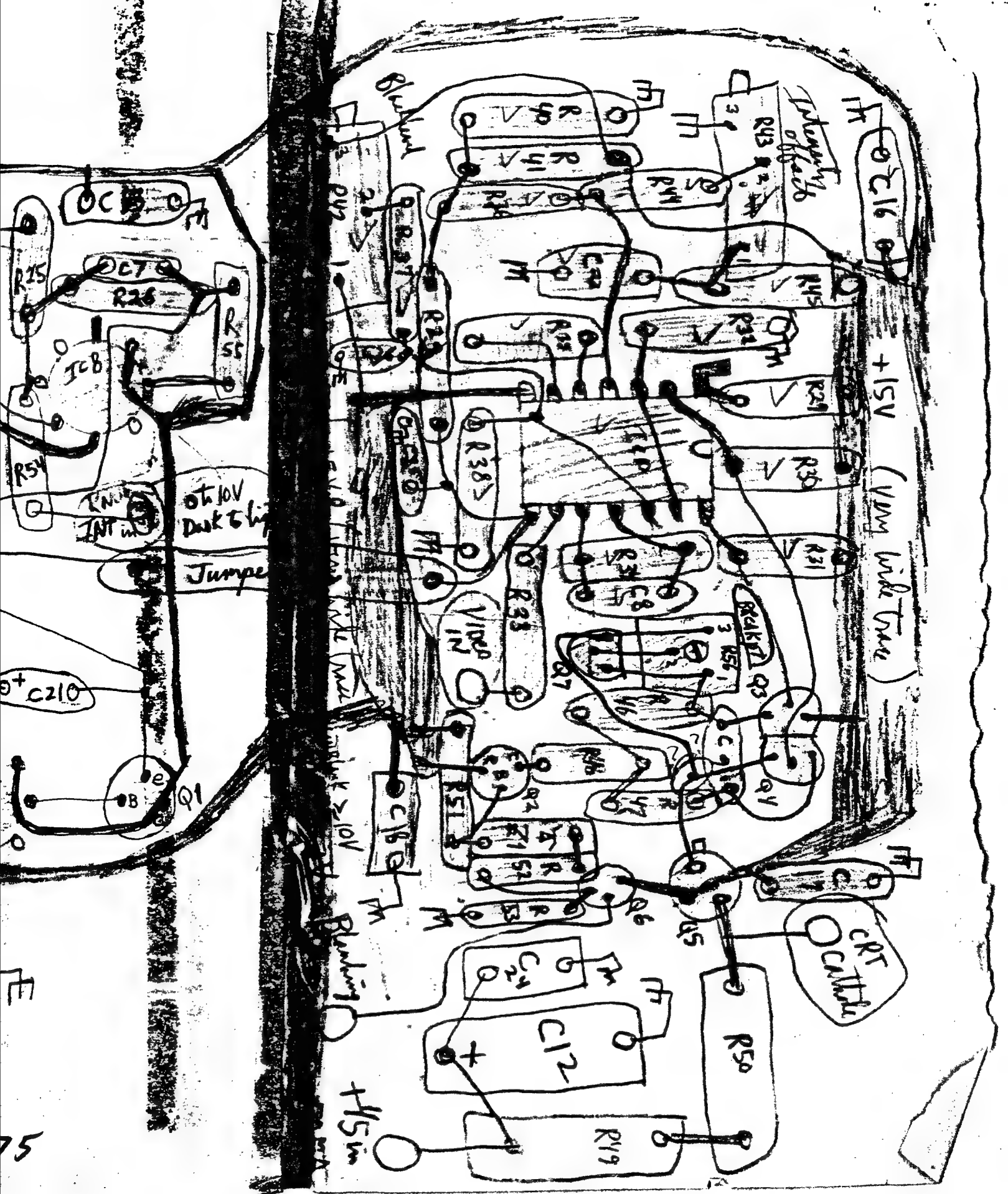
C38 - .1

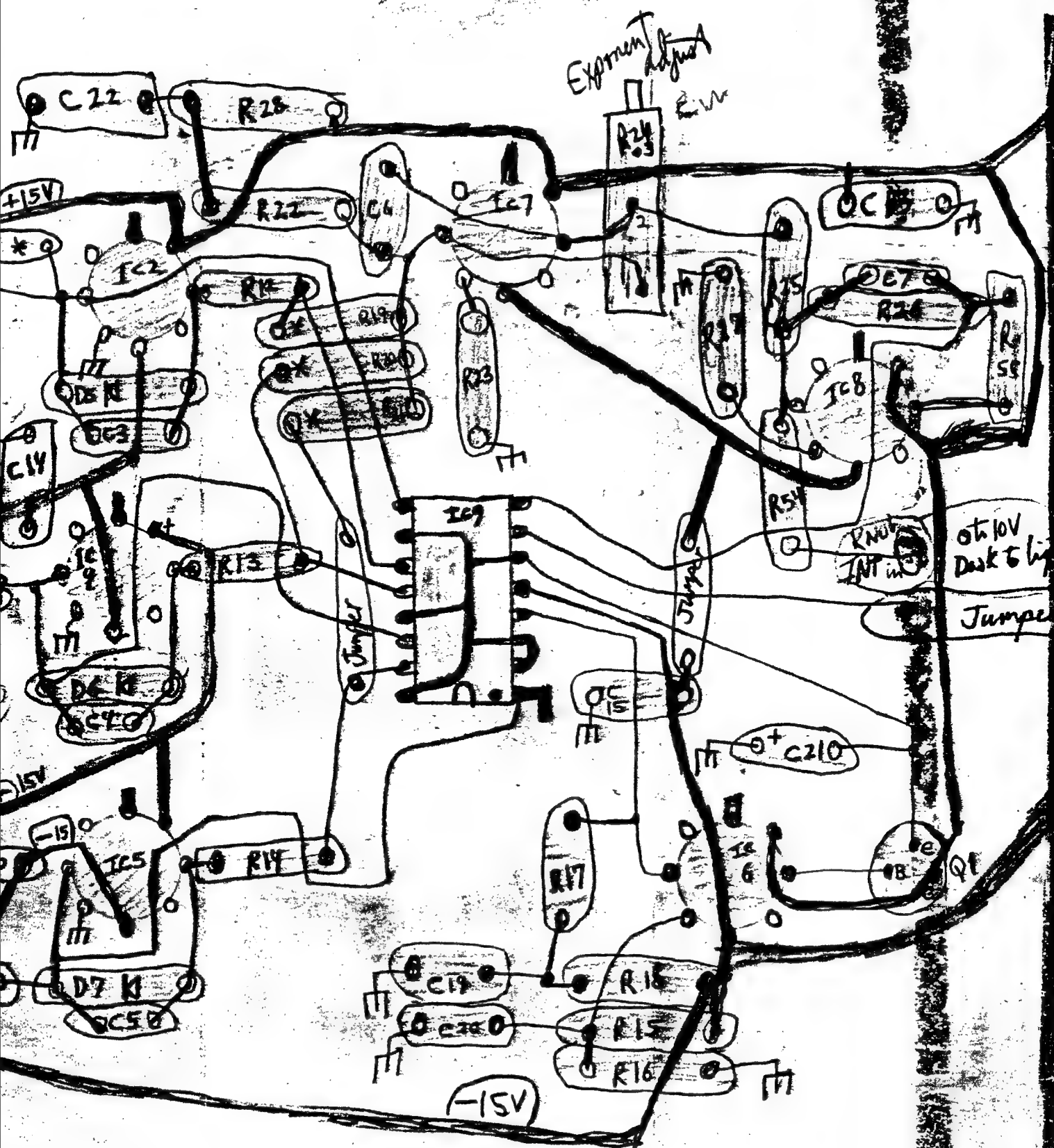
C39 - .1

C40 - .1

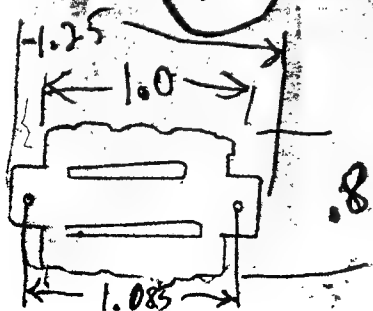
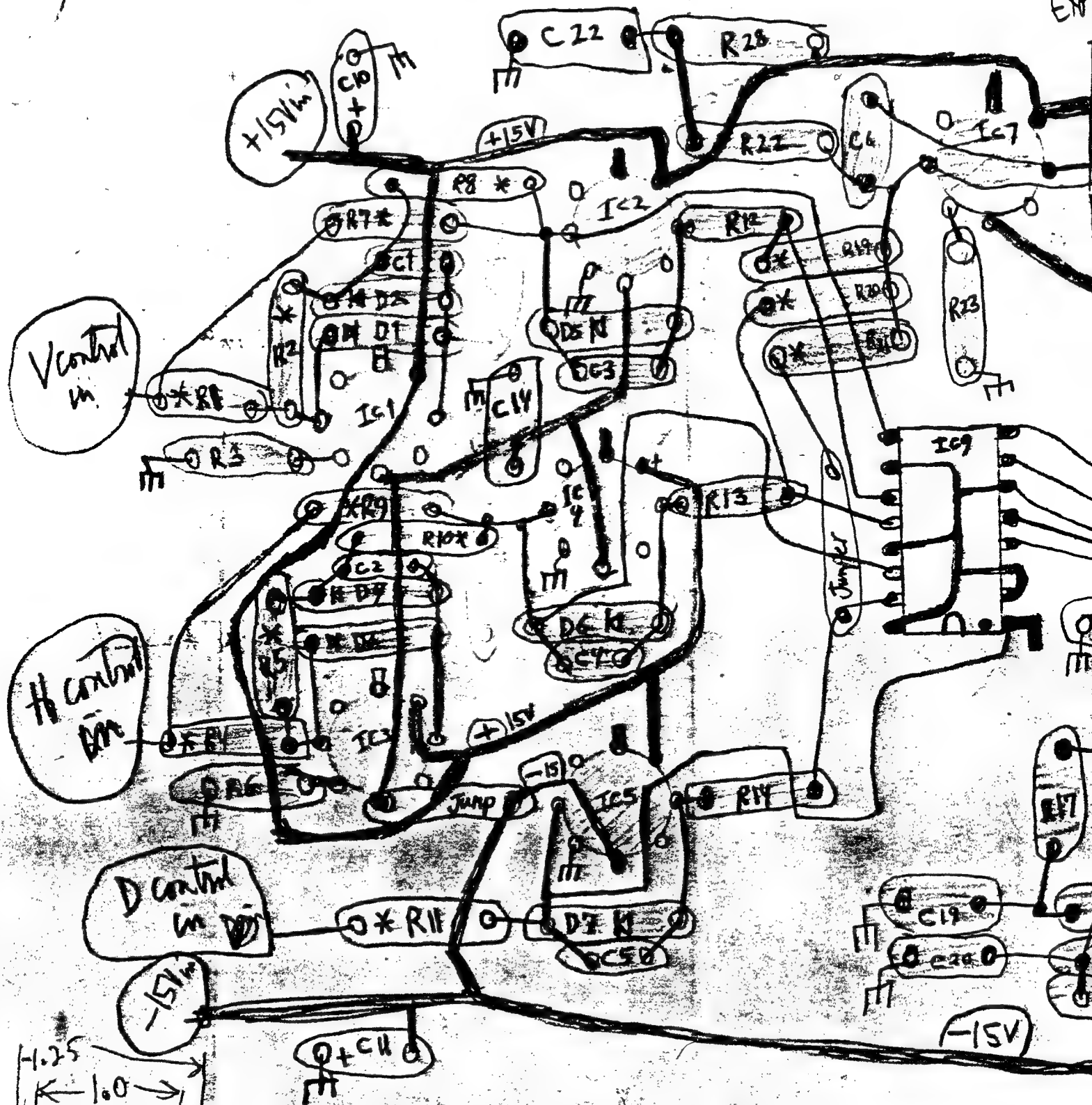
C41 - .1

C42 - .1



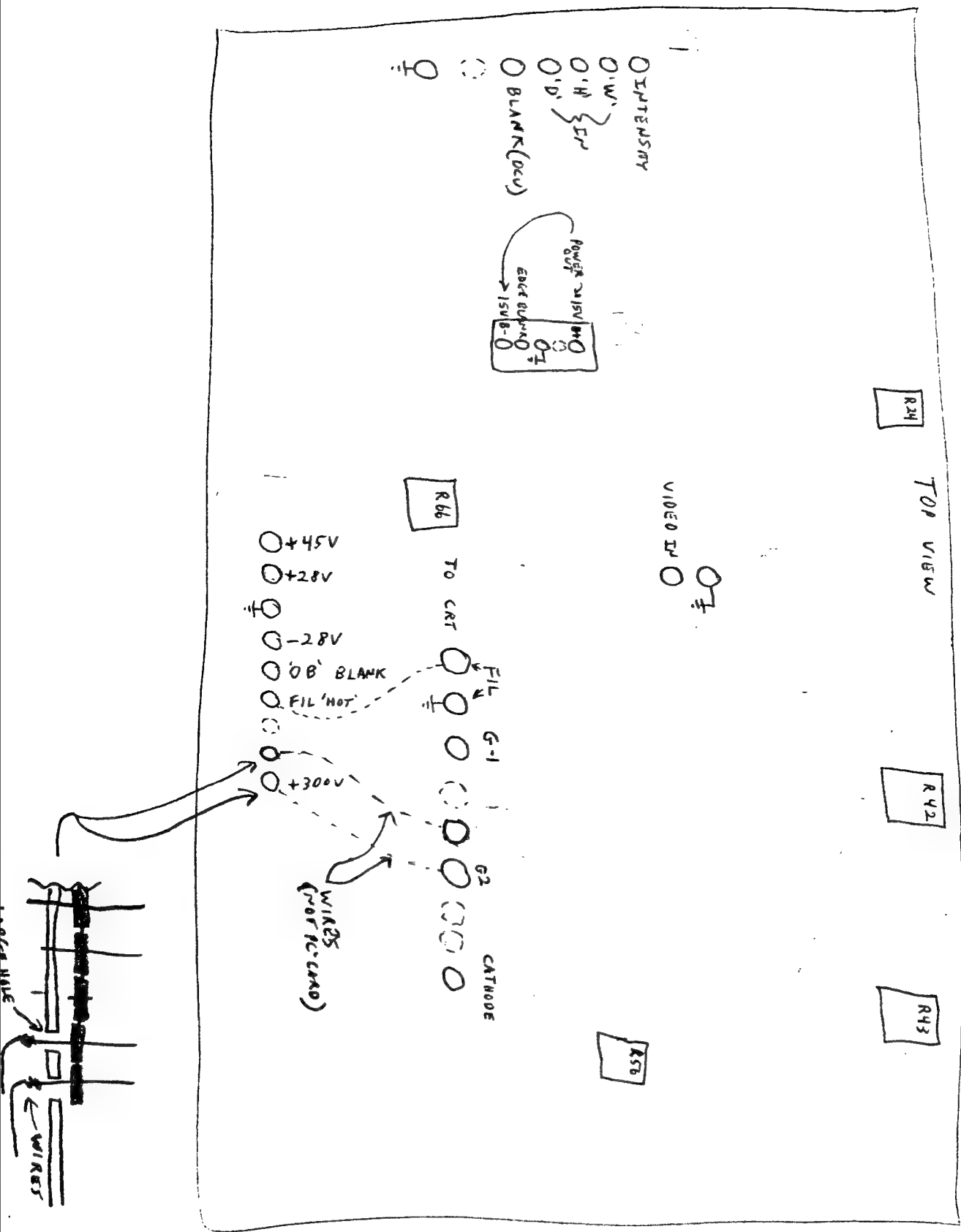


CRT DRIVER JAN 16/75



CRT DRIVER J

PC-132 CH11C AGO



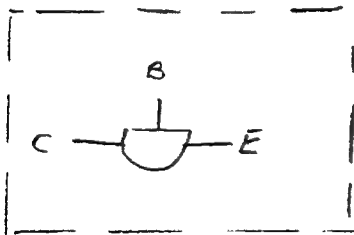
2/10/78

Corrections- continued

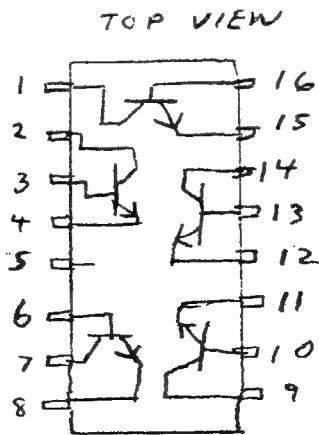
- 19) Reduce the value of R61
- 20) Put a limit potentiometer, on the intensity (DCU), and bias potentiometer, to set Ext Int. at specific range
- 21) Add a resistor in series with the +45 Volt input.

Pinout for CA-3083

CA3083 - GENERAL PURPOSE, HIGH CURRENT  
NPN TRANSISTOR ARRAY



SUBSTRATE



PC132 Parts List - High Resolution CRT Driver  
with V,H,D<sup>2</sup> Correction

Revised Jan. 16, 1975

Retyped Jeffrey Schier 6/1/78

Note: All resistor values are 5% 1/4 Watt unless otherwise noted

Integrated Circuits

IC 1 - LM318H  
IC 2 - LM318H  
IC3 to IC8 - LM318H  
IC 9 - CA3083 (? 30183 ,80 Volt)  
IC 10 - MC1595 with heat sink  
IC 11 - SG4501

Transistors

Q1 - 2N3568 or equivalent  
Q2 - 2N3646  
Q3 - 2N5770 (note Q3 and Q4 should  
Q4 - 2N5770 be strapped together)  
Q5 - 2N2219A  
Q6 - 2N3646  
Q7 - 2N5770            Q9 - 40409  
Q8 - 2N3646            Q10 - 40410

Diodes

D1 to D7 - 1N914A  
(note : Diode leakage must be  
less than 1 uA at 15 Volt reverse  
bias)  
D8 - 1N914  
D9 - Zener 1N5248B

Resistors - (Values in ohms)

R1 - 10K 1%  
R2 - 10K 1%  
R3 - 4.7K  
R4 - 10K 1%  
R5 - 10K 1%  
R6 - 4.7K  
R7 - 10K 1%  
R8 - 5K 1%  
R9 - 10K 1%  
R10 - 5K 1%  
R11 - 5K 1%  
R12 to R14 - 510 (possibly changed  
to 470 ohm)  
R15 - 18K  
R16 - 1K  
R17 - 4.7K  
R18 - 4.7K

Resistors (continued)

R19 - 20K 1%  
R20 - 20K 1%  
R21 - 10K 1%  
R22 - 100K  
R23 - 3.3K  
R24 - 10K trim  
R25 - 10K  
R26 - 10K  
R27 - 4.7K  
R28 - 4.7K  
R29 to R32 - All 510 ohm or  
all are 470 ohm  
R33 - 100  
R34 - 220  
R35 - 220  
R36 - 1K  
R37 - 1K  
R38 - 100  
R39 - 1K  
R40 - 100  
R41 - 1K  
R42 - 20K trim  
R43 - 20K trim  
R44 - 4.7K  
R45 - 100K  
R46 - 10  
R47 - 100  
R48 - 680  
R49 - 510 1/2 Watt (or 470)  
R50 - 510 1/2 Watt (or 470)  
R51 - 1K  
R52 - 1K  
R53 - 10K  
R54 - 220K  
R55 - 510  
R56 - 1K trim  
R57 - 75  
R58 - 1K  
R59 - 10K  
R60 - 10K  
R61 - 2.7K  
R62 - Dale 0.5 ohm 1%, 1 Watt  
R63 - Dale 0.5 ohm 1% 1 Watt  
R64 - 75

# alignment

Note: System should be warmed up for 5 minutes before alignment is attempted.

- ① Intensity offset - Tube Not cut off  
 $H_{in} = 0V$   
 $V_{in} = 0V$   
 $D_{in} = 0V$   
 adjust R 45 for no visible picture or no video on CRT cathode  
 intensity pot all the way down.
- ② Black level - Self explanatory
- ③ Low level Exponent adjust - adjust tube cutoff  
 (Low level intensity) (set intensity to zero and just turn CRT spot out) Black level is R 56 all the way CCW - .7 Volt pin 12, IC 10, Video in gated  
 Set size and intensity for a picture. (very low level, small size)  
 adjust "Exponent adjust" for constant Visual intensity as picture changes size.
- ④ Break pt adj - adjust size or intensity until shading error appears  
 try adjusting R 56 until best shading vs. intensity occurs

- 11) ADD 2.102 IN SERIES WITH B- TO Q-2, R-51, C-18
- 12) CHANGE C-18 TO 15 $\mu$  20V TANT (+ IS GND SIDE)
- 13) Change C-16 TO 15 $\mu$  25V
- 14) OMIT C-13 (BE SURE TO CHANGE R-27 GND)



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5) PUT RESISTORS IN SERIES  
WITH  $\pm 28V$  TO LIMIT 40409#10  
DISSIPATION

~~6) Change C-21 TO 10 $\mu$  CER, or 2 TANT  
BACK TO GND~~

7) 11 R-44 TO 10K FROM 100K  
(change noted on parts list)

8) 11 R-54 TO 220K  
(change noted on parts list)

9) ADD 470K FROM (C-22, R-28, 22) TO PIN 2 4IC-8  
THIS OFFSETS LOG CIRCUIT TO HELP LOGARITHMIZE  
INTENSITY INPUT

10) Change R-44 FROM 10K TO 4.7K  
change noted on parts list

NOTE a) "WHITE SPREAD" IS 'OFF' WHEN  
POT IS C.W.

b) R-46 + R-47 CONTROL GAIN OF MULT. AMP.  
IF GAIN IS TOO HIGH (TO MUCH CONTRAST) RAISE  
THEIR VALUE (IN PROPORTION) + YOU WILL Reduce GAIN  
+ LOWER C-9 BY THE SAME PROPORTION

# Layout Note

(over for alignment ins)

Marked (X) resistors are 1% or better (preferably metal film) (different size?)

Heavy  $\pm 15V$  trace

1K : 2K

35 INDEPENDENT

FROM 10K/20K

ground plane

Leave ICs 2, 4, 5, 6, 7, 8 equidistant  
(about 1 inch) from IC9 for thermal

reason

Short CRT cathode lead

You can move inputs (V in H in D in)  
together to a convenient spot

V in cannot be moved

V in 75  $\Omega$  load is now a BNC panel  
connector

Q-3 & 4 SHOULD BE TIED TOGETHER  
for heat transfer with silicone

# PC 132 Parts List- High Resolution CRT Driver

with V, H, D<sup>2</sup> Correction

(continued)

Revised Jan. 16, 1975

retyped by Jeffrey Schier 6/1/78

## Resistors (continued)

Note-- all values in ohms

5% 1/4 Watt unless otherwise noted

R65 - 75 ohm

R66 - 20K trim (GR10 #1)

R67 - 4.7K

## Capacitors (continued)

C34 - 6.8 uf 35 VDC (Tantalum)

C35 - ? uf ceramic disc  
over 300 volt

C36 - 0.01uf 1KV ceramic disc

C37 - 0.01 uf 1KV " "

C38 - 0.01 uf 1KV " "

C39 - 0.01 uf 1KV " "

## Capacitors

C1 - 47 pf ceramic disc

C2 - 47 pf " "

C3 - 47 pf " "

C4 - 47 pf " "

C5 - 47 pf " "

C6 - 10 pf " "

C7 - 10 pf " "

\* C8 - 100 pf " "

\* C9 - 100 pf " "

C10 - 15 uF @ 20 Volts (Tantalum)

C11 - 15 uf @ 20 Volts " "

C12 - 22 uf @ 50 Volts " "

C13 - 0.1 uf ceramic disc

C14 - 0.1 uf " "

C15 - 0.1 uf " "

C16 - 0.1 uf " "

C17 - 0.1 uf " "

C18 - 0.1 uf " "

C19 - 0.1 uf " "

C20 - 0.1 uf " "

C21 - 15 uf / 20 Volt (Tantalum)

C22 - 0.1 uf ceramic disc

C23 - 0.1 uf " "

C24 - 0.1 uf " "

C25 - 220 pf " "

C26 - 220 pf " "

C27 - 0.1 uf

C28 - 0.1 uf

C29 - 0.1 uf ceramic disc

C30 - 0.01 uf " "

C31 - 0.01 uf " "

C32 - 6.8 uf / 35 VDC (Tantalum)

C33 - 6.8 uf / 35 VDC " "

\* Compensation Capacitors should be adjusted for High Frequency Bandwidth

### Alignment Procedure

Note : System should be warmed up, for 5 minutes before alignment is attempted.

- 1) Intensity Offset - Tube not cut-off when  
Hin = zero volts  
Vin = zero volts  
Din = zero volts  
Intensity Pot all the way 'down'

Procedure - Set controls to the above values. Adjust R45 for No visible picture, or no Video on Crt Cathode

- 2) Black Level - Self explanatory
- 3) Low Level Exponential Adjust -  
Procedure - Adjust tube cutoff (set intensity to zero, and  
just turn Crt spot out.  
For 'low level intensity' turn R56 all the way CCW.  
Black level, is -0.7 volts at IC10/Pin 12, with Video grounded.  
Set sizes and intensity, for a picture ( Very low level,  
small size picture)  
Adjust "exponent adjust" for a constant 'Visual' intensity,  
as the picture is changed in size.
- 4) Break Point Adjust - Adjust size or intensity, until shading  
error appears. Try adjusting R56 until shading vs. intensity  
is at its best value.

## Layout Notes

Marked (\*)resistors are 1% or better (preferably metal film)  
(different size?) 1K : 2K is independent from 10K to 20K

Heavy + and - 15 Volt traces.

## A Ground Plane

Leave IC's 2,3,4,5,6,7,8 equidistant  
(about 1 inch) from IC9, for thermal reasons.

A short length CRT cathode lead.

You can move inputs (Vin, Hin, Din) together to a convenient spot.

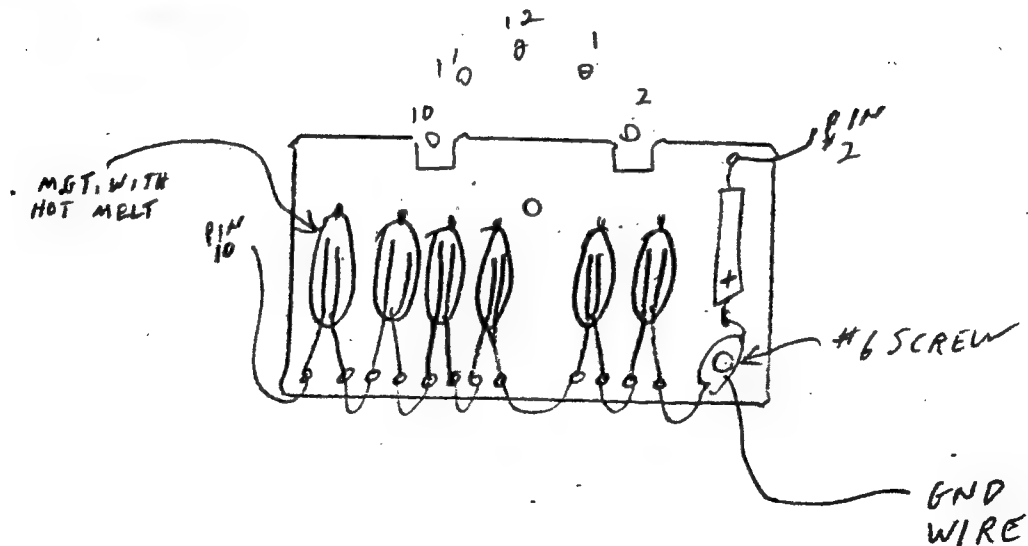
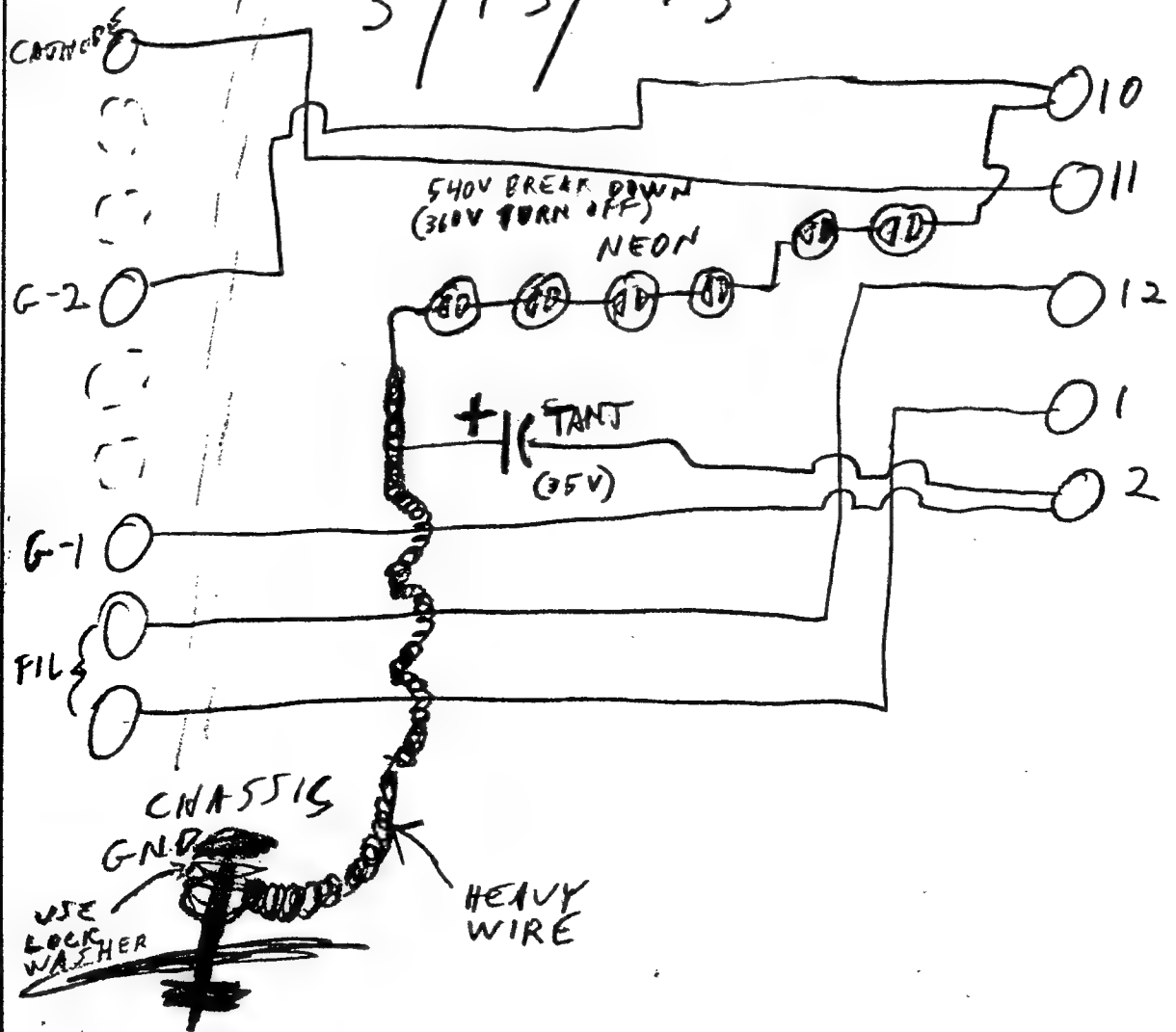
Video input cannot be moved.

Video 75 ohm load is now at the BNC panel connector.

Q3 and Q4 should be strapped together, for heat transfer, with silicone between the transistors.

# CRT SOCKET FOR PC-132

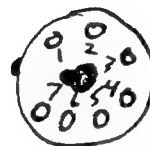
3/13/75



PC-132

100E  
SOCKET  
CONNECTIONS

PANASONIC TUBE



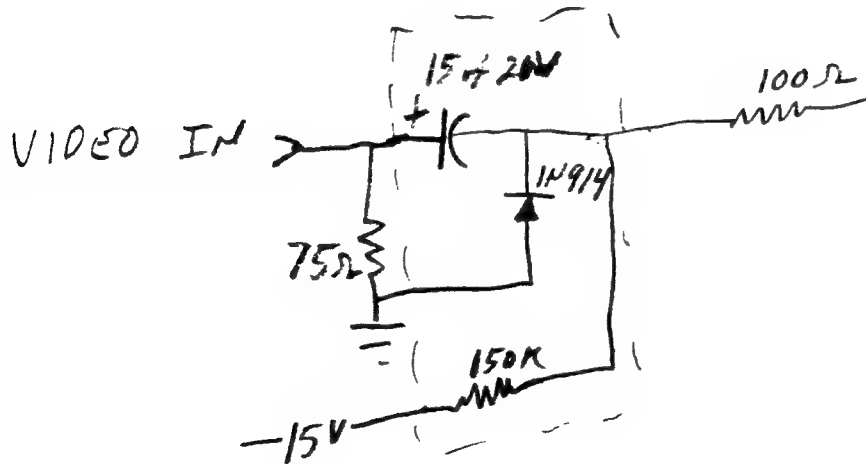
BACK VIEW

- 1) KATHODE (GREEN)
- 2) G-2 (YELLOW) +500V
- 3) FIL. (BROWN) }
- 4) FIL. (BLACK) } 12.6V
- 5) G-1 (RED)
- 6) DO NOT USE
- 7) G-3 (ORANGE) FOCUS WIPER 0 TO +500V

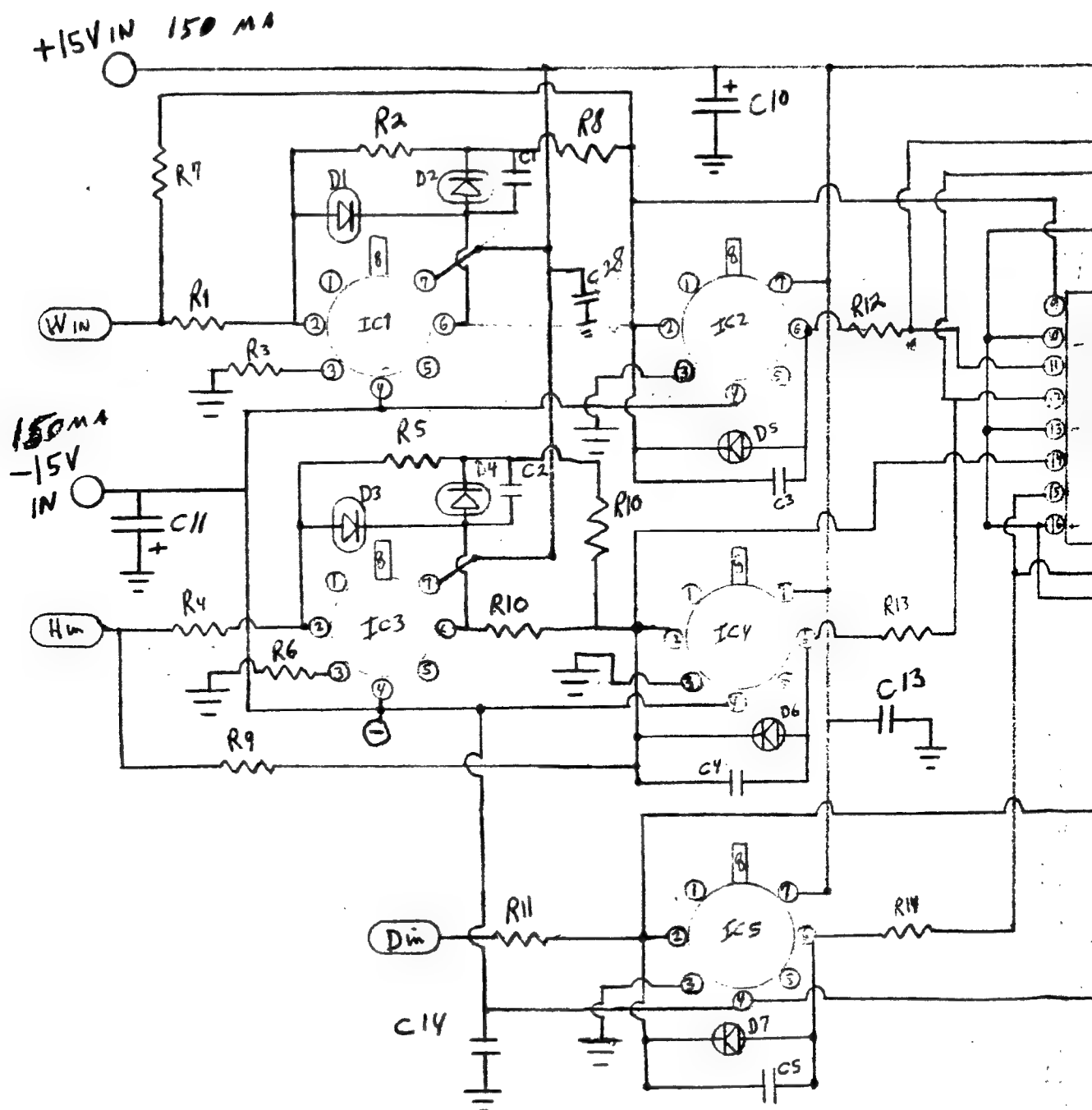
PC-132

CHICAGO

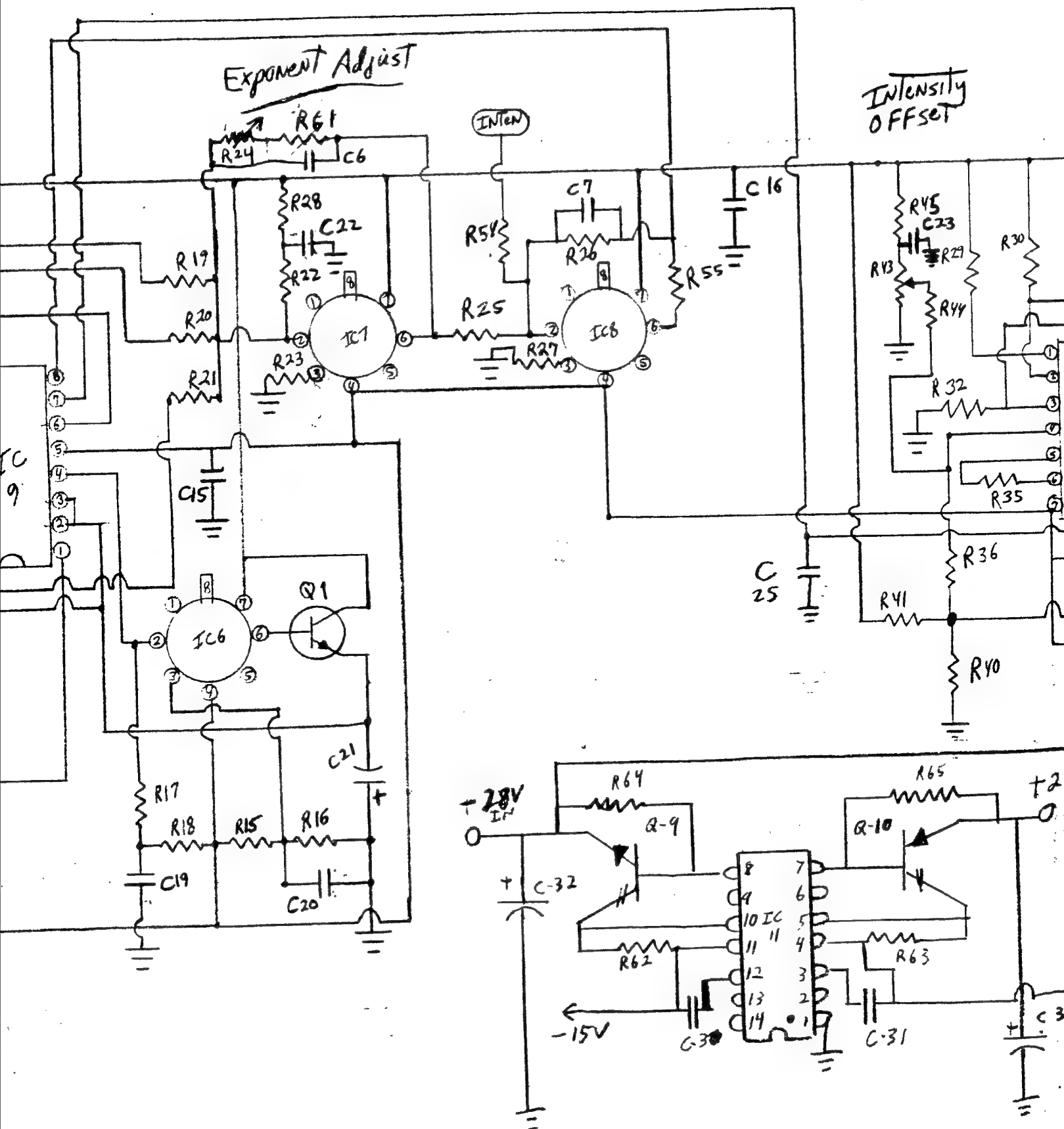
# VIDEO CLAMP



1/2/75 Robert D. Kull



# Driver With H-V-D Compensation



# Matsushita Electronics Corporation

Telephone No.  
TAKATSUKI (82) 5521

Takatsuki, Osaka, Japan  
Telex: MECTRON J63461  
140AKB4

Cable Address  
"MECTRON" TAKATSUKI

## CATHODE RAY TUBE

The 140AKB4 is a 5"-55°, directly viewed, rectangular, glass picture tube of the low voltage electro-static focus and magnetic deflection type. The 140AKB4 employs a very small diameter neck of 0.788". The 140AKB4 has a 12.6 volts 64 milliamperes heater and its maximum overall length is 7.953 max. inches thus very suitable for micro portable T.V. set.

## GENERAL DATA

### ELECTRICAL DATA

Heater Current at 12.6 volts .....	64 mA
Direct Interelectrode Capacitance:	
Grid No.1 to all other electrodes .....	7 pF
Cathode to all other electrodes .....	4 pF
External conductive coating to anode .....	{ 400 max pF 200 min pF
Focusing Method .....	Electrostatic
Deflection Method .....	Magnetic
Deflection Angles (Approx.)	
Diagonal .....	55 degrees
Horizontal .....	degrees
Vertical .....	degrees
Electron Gun:	
Ion trap .....	Not Required
Focus lens .....	Tripotential

### OFFICIAL DATA

Faceplate .....	Filterglass
Light transmission at center (Approx.) .....	70%
Phosphor .....	P4-Sulfide Type Aluminized
Fluorescence .....	White
Persistence .....	Medium short

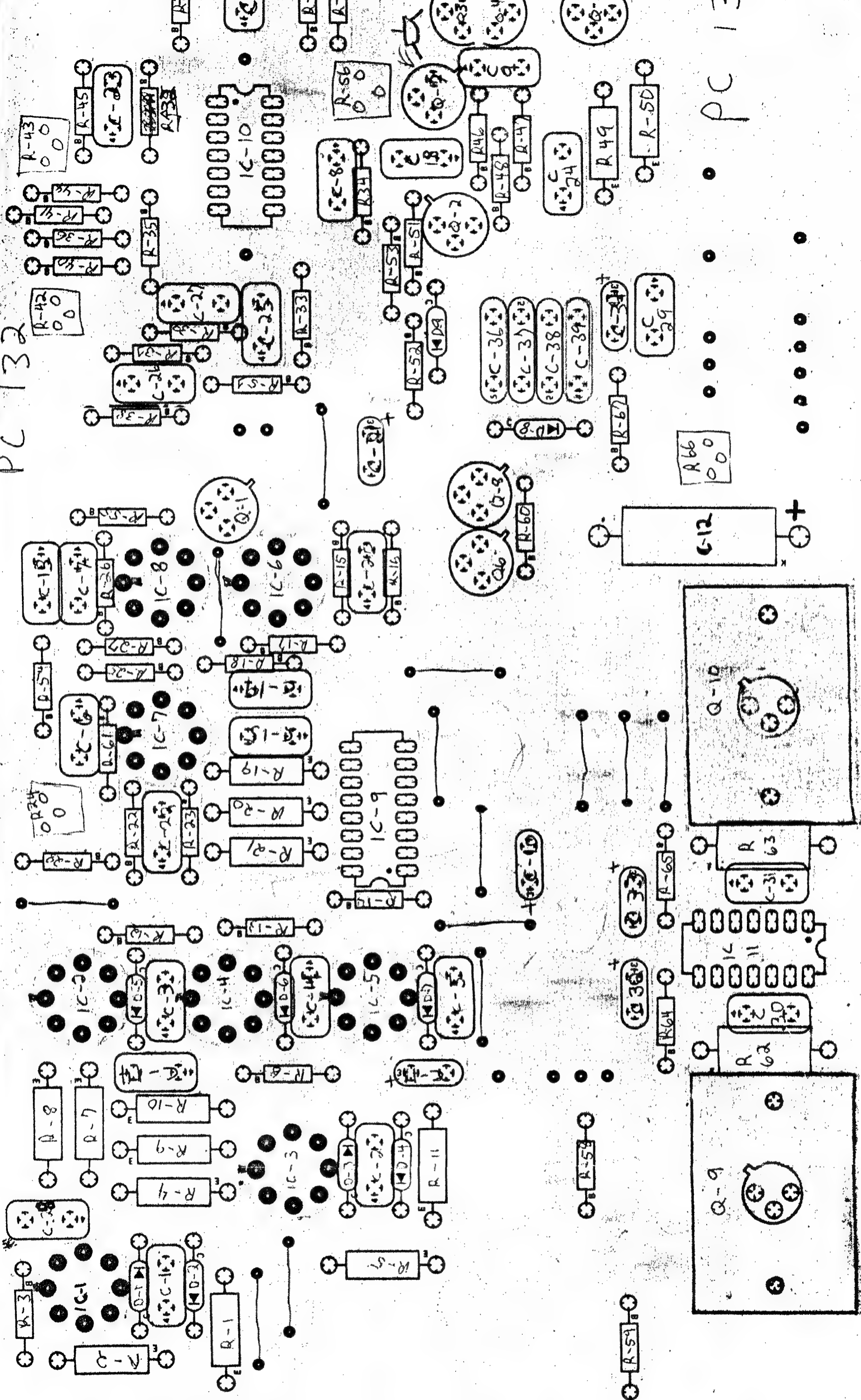
### MECHANICAL DATA

Tube Dimensions:	
Overall length: .....	7.953" max. (202 mm)
Greatest dimensions of tube:	
Diagonal .....	5.406"+0.078" (137.3+2) <sup>mm</sup>
Width .....	4.732"+0.078" (120.2+2) <sup>mm</sup>
Height .....	3.760"+0.078" (95.5+2) <sup>mm</sup>

Dec. 24, 1971

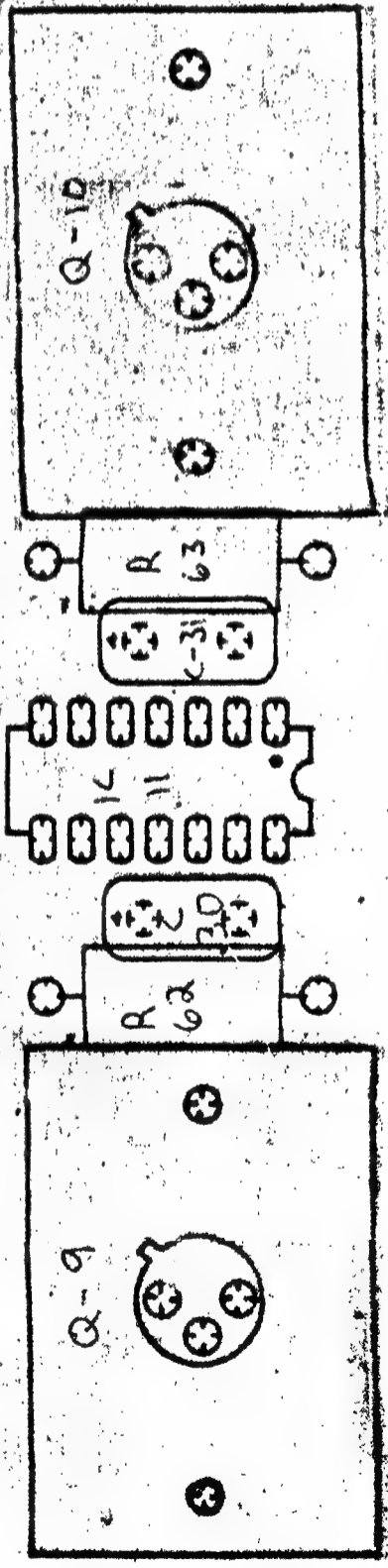
140AKB4  
Sheet 1 of 7

PC 132



PC 132

R66  
00



IC-1 MC-1494  
IC-2 LM318  
IC-3 " "  
IC-4 " "

D-1 1N914

D-2 1N914

D-3 " "

D-4 " "

D-5 " "

D-6 " "

Q-1 NPN 2N3568

Q-2 PNP 2N3638A

Q-3 NPN

Q-4 PNP

C-1

C-2 10 PF

C-3 15 $\mu$ F 20V

C-4 15 $\mu$ F 20V

C-5 10 PF

C-6 .1 CER

C-7 .1 CER

C-8 10PF

Q-1 NPN 2N3568

Q-2 PNP 2N3638A

Q-3 NPN 2N3568

Q-4 PNP 2N3638A

Q-5 FET

Q-6 NPN 2N3568

Q-7 NPN 2N3568

Q-8 NPN 2N3568

R-1 27K

R-2 15K

R-3 12K

R-4

R-5 20K POT

R-6 20K POT

R-7 20K POT

R-8 47K

R-9 10K

R-10 10K

R-11 10 $\Omega$

R-12 10 $\Omega$

R-13 100K POT

R-14

R-15 10K 5%

R-16 10K 5%

R-17 10K

R-18 10K

R-19 10 $\Omega$

R-20 10 $\Omega$

R-21

R-22 6.8K

R-23 20K

R-24 6.8K

R-25

R-26 10K

R-27 20K

R-28 15K

R-29 10K

R-30 OMIT

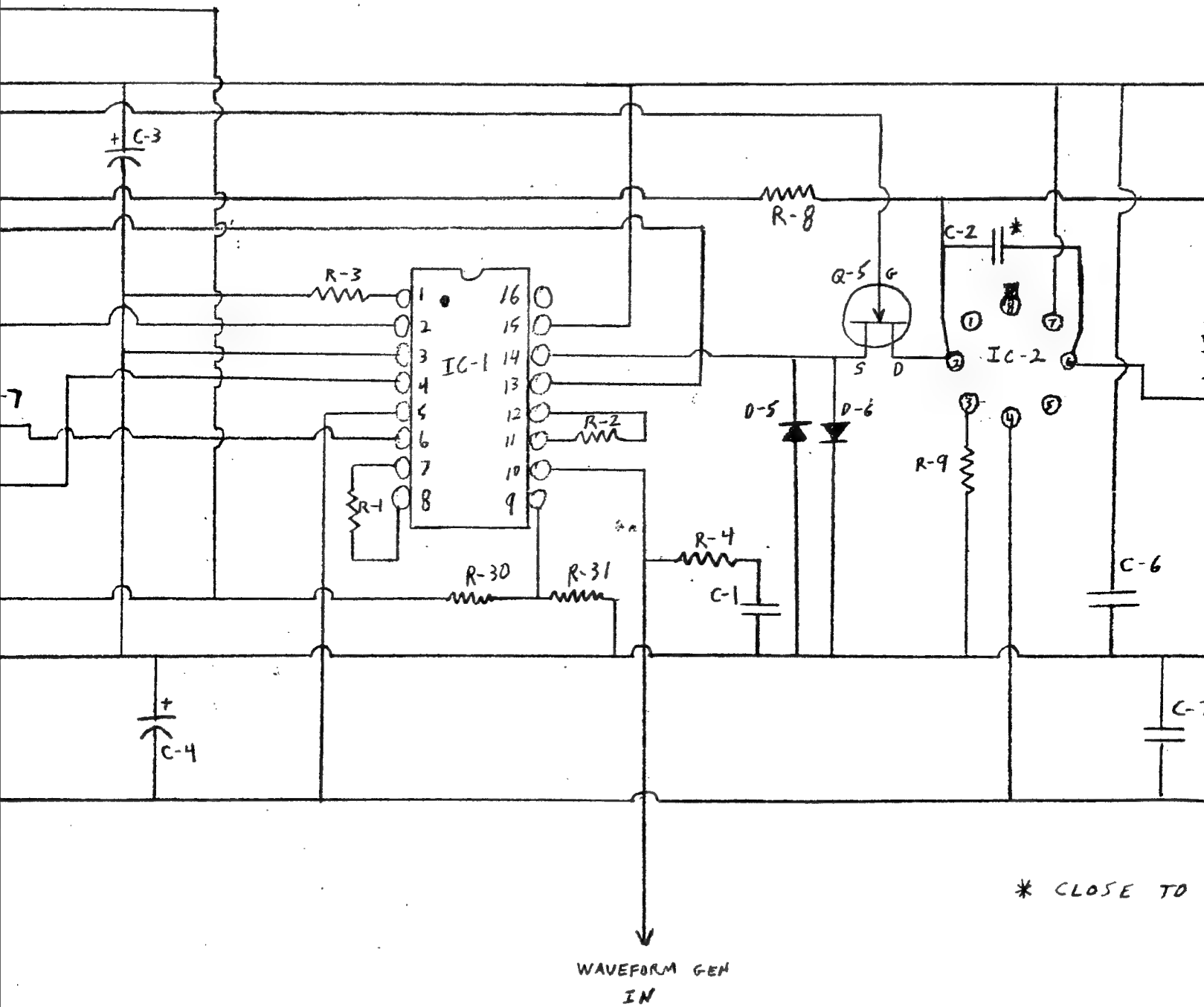
R-30 2.2K

R-31 10K

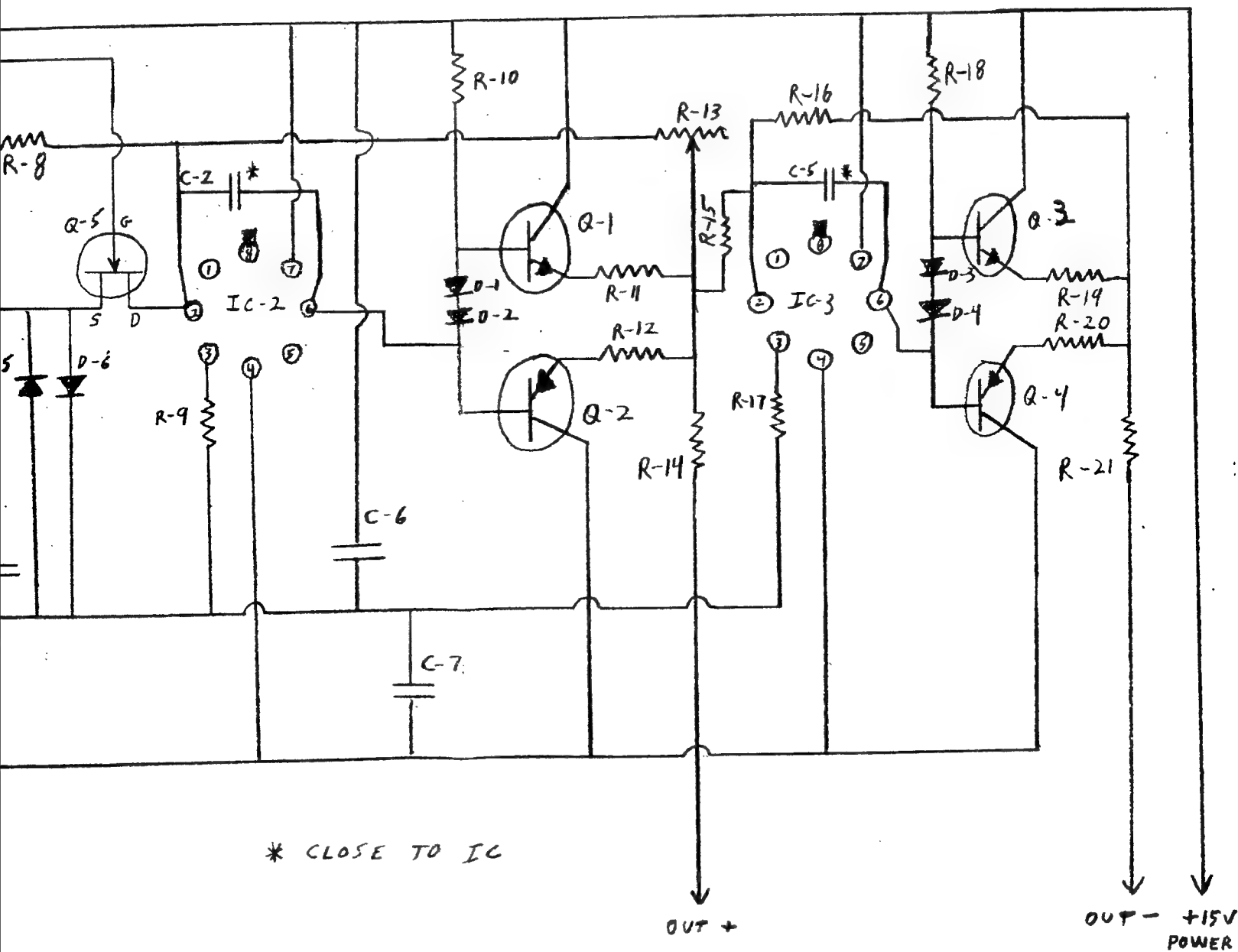
# MODULE MULTIPLIER PARTS LIST

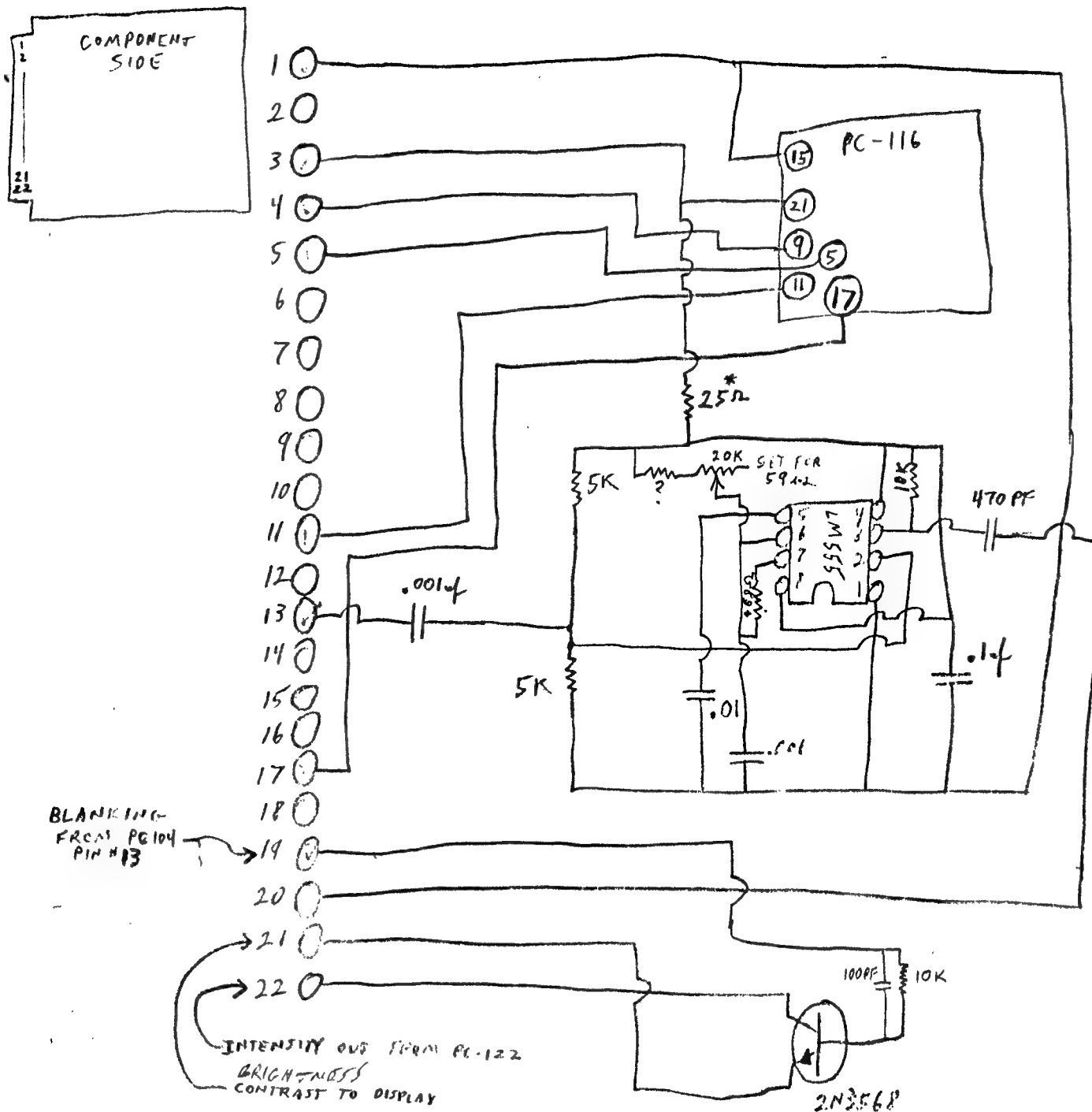
DEC. 1974

*Jeff*



RUTT ELECTROPHYSICS CORP  
MODULE MULTIPLIER  
DEC. 1974

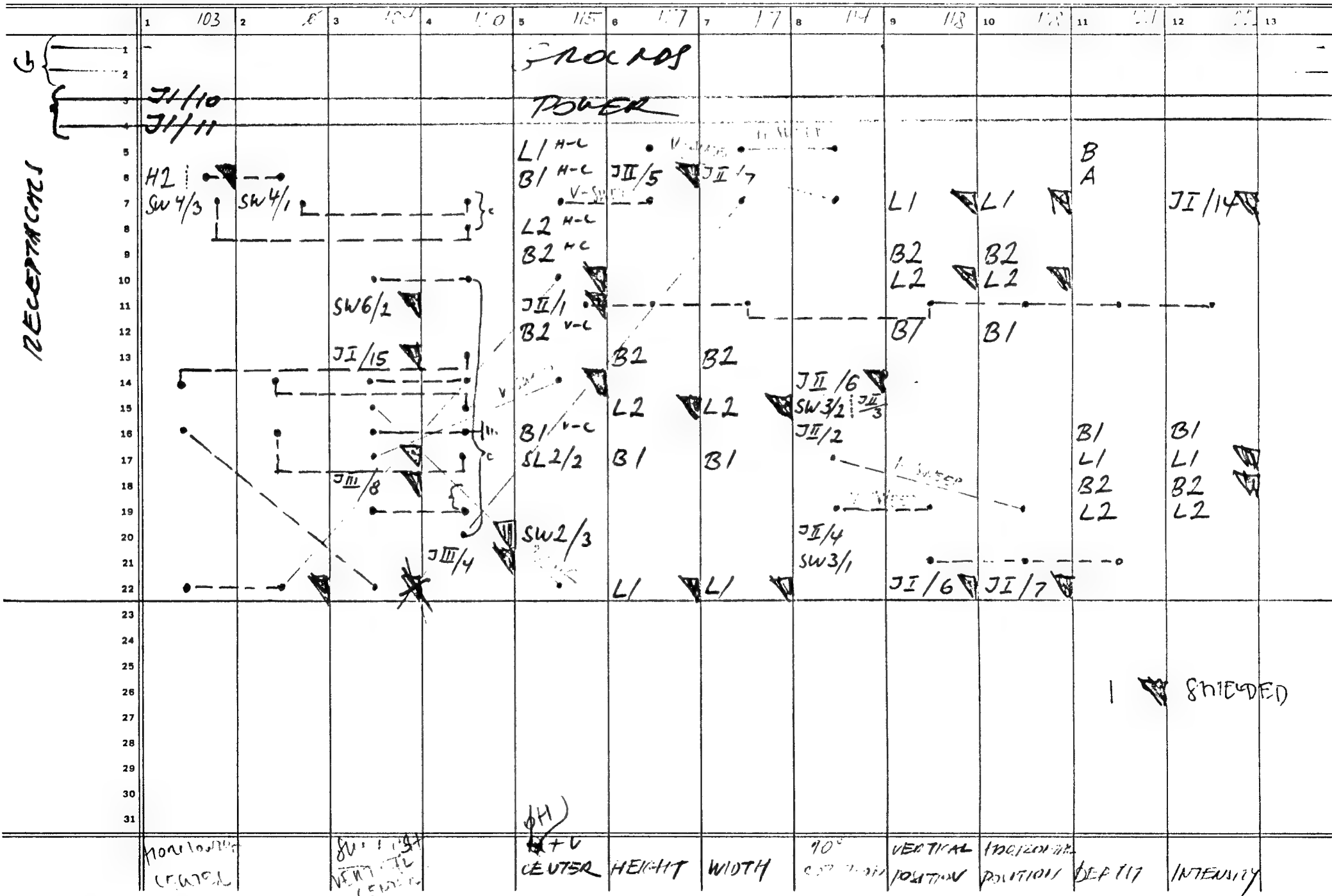




\* RES TOL +100% - 50%

# R/E CONTROL UNIT

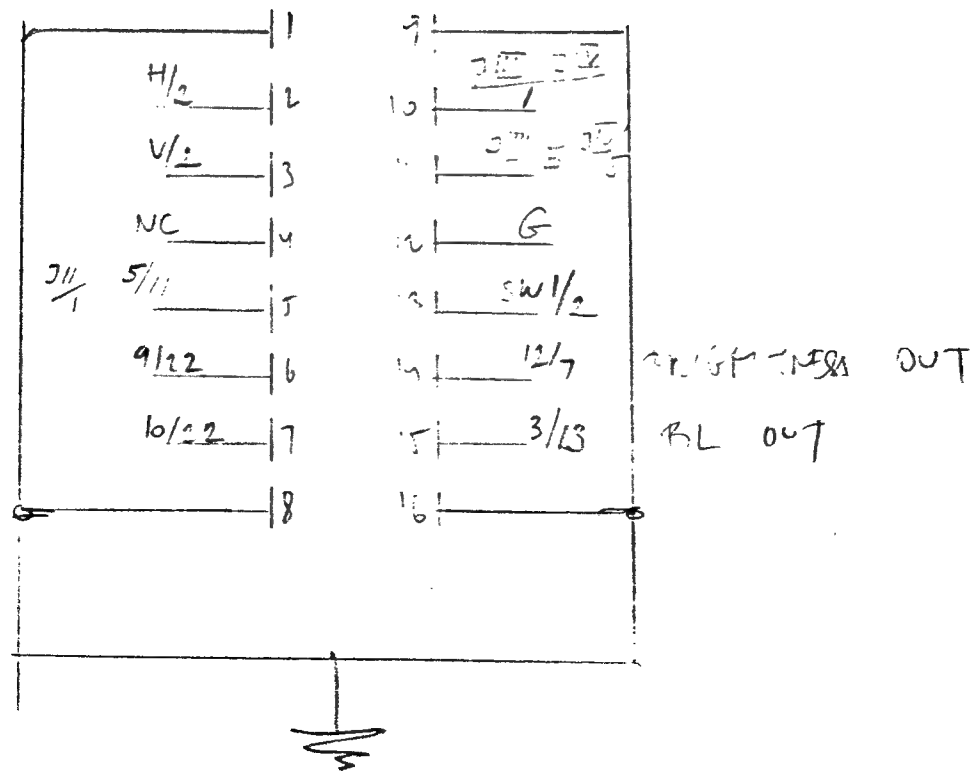
SLOTS:



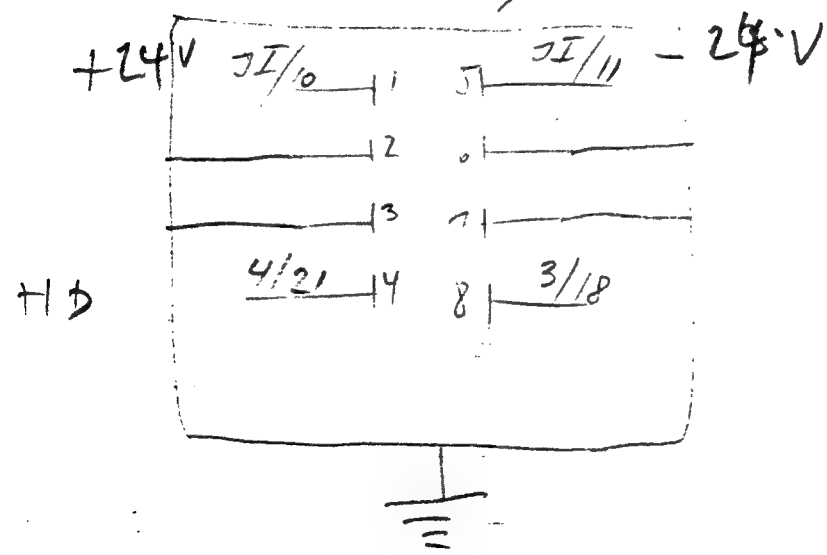
CONTROL UNIT.

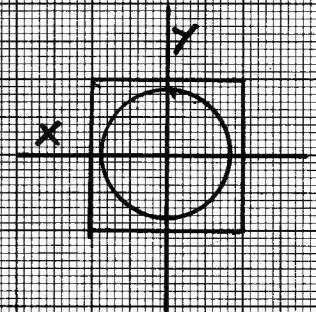
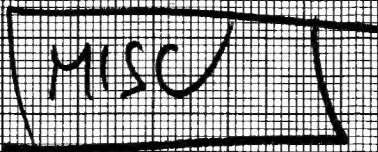
J I.

V CONTROL  
V CONTROL



J III / IV





# WAVEFORM GENERATOR Q-17

